Journal of FORESTRY

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Volume 53
Number 2

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Journal of Forestry

Official Organ of the Society of American Foresters

The Forest Service's First Fifty Years

Richard E. McArdle
Chief, Forest Service,
U. S. Department of Agriculture

IT WAS ONLY a little more than 90 years ago that the word "forestry" first appeared in an American dictionary. Worcester's dictionary came out with it in 1860, defining the word as "The art of forming or cultivating forests." The 1864 edition of Webster's included the word, with a somewhat similar definition. (In England, "forestry" had been cited in dictionaries for a couple of centuries as a Scottish law term having to do with the privileges of a royal forest.)

So both the word and the concept of forestry, in the sense of positive forest management, were relatively new in the United States when the Forest Service came into being in 1905. The half century since then covers essentially the whole span of concrete accomplishment in forestry in this country. The Forest Service's 50th birthday is significant, I believe, because it illustrates the newness of the forestry profession in the United States as compared with professional forestry in Europe. It marks an occasion for taking a look at how far our profession has come in half a century.

But that does not mean that forestry effort was totally lacking in this country prior to 1905. Though they hadn't yet found the word for it, some forward-looking individuals were thinking and talking and writing about measures for management of forests before the end of the Civil War. During the last quarter of the nineteenth century, the idea of applying scientific principles to the management of forests received quite a bit of attention.

Early in that century local wood shortages around some of the large population centers had begun to cause anxiety. In 1817, the *Connecticut Courant* published a communication from Noah Webster—the same Webster of dictionary fame—about the need for increasing production of wood. Massachusetts in 1837 made provision for a survey "having for a principal object to promote the agricultural benefit of the commonwealth, by leading the owners of land to a consideration of the importance of continuing, improving, and enlarging the forests of the State."

Concern about the forests became more manifest following the War Between the States. Military operations had caused extensive destruction in some areas; the cut-over areas following lumbering were spreading; forest fires were causing widespread destruction. Such things as these were causing some persons to wonder about future supplies of timber. A few observant individuals were also becoming aware of the value of forest cover in protecting the headwaters of streams.

In 1865, a paper about forest conditions by the Rev. Frederick Starr appeared in the annual report of the U. S. Department of Agriculture. He advocated a program of government-sponsored research on the management of forests and planting of trees. In 1873, the American Association for the Advancement of Science, at its meeting in Portland, Maine, appointed a committee to memorialize Congress and the state legislatures, urging them to make provision for the proper use and perpetuation of American forests. During the late 1860's and early 1870's, the States of Wisconsin, Maine and New York set up commissions to consider matters of forest policy.

There was an upsurge of interest in tree planting about this time. Several states enacted laws to encourage planting by offering bounties or granting tax reductions. The first Arbor Day was observed in Nebraska in 1872; its founder, J. Sterling Morton, later became Secretary of Agriculture. Congress in 1873 passed the Timber Culture Act, which offered free land to settlers who would plant 40 acres of trees (later reduced to 10 acres) on each 160-acre claim.

Governmental forestry work actually got under way in 1876, when Congress authorized the Commissioner of Agriculture to appoint a "man of proved attainments" to

> . . . . prosecute investigations and inquiries, with the view of ascertaining the annual amount of consumption, importation, and exportation of timber and other forest products, the probable supply for future wants, the means best adapted to their preservation and renewal, the influence of forests upon climate, and the measures that have been successfully applied in foreign countries, or that may be deemed applicable in this country, for the preservation and restoration or planting of forests; and to report upon the same to the Commissioner of Agriculture to be by him in a separate report transmitted to Congress.

The man selected for this rather sizable job was Dr. Franklin B. Hough, a physician and former Civil War surgeon who had become much interested in the forests. He had headed the committee named by the AAAS to prepare the memorial to Congress. Dr. Hough was ready with a 650-page report a year later. His appointment was continued, and he completed another report in 1878, and a third in 1882. His three reports brought together more information on American forests than had ever before been assembled.

Era of Small Beginnings

Dr. Hough's agency in the Department of Agriculture became a Division of Forestry in 1881. During its first few years it consisted of a chief and three field agents,

GIFFORD PINCHOT, 1905-1910

whose combined salaries and expenses were covered by an annual appropriation of $10,000. In 1883, Dr. Hough was succeeded by Nathaniel H. Egleston. Three years later, Bernhard Eduard Fernow became head of the Division. Dr. Fernow, a native of Prussia, had been trained in forestry in Europe. During the 12 years he headed the Division, his staff never totaled more than a dozen. But the numerous bulletins and reports the Division issued helped to increase public interest in forestry.

Gifford Pinchot became head of the Division of Forestry in 1898. He began immediately to expand both the volume and the intensity of the work. He appointed a number of scientists from the universities as collaborators. He employed student assistants at $40 a month; many of them were later to become leaders in American forestry.

The Division of Forestry became a Bureau of Forestry in 1901. The work of this Bureau and of the Division which preceded it was largely in the fields of research and of cooperation with forest land owners. The Bureau offered to help private owners plan their timber harvests so as to obtain successive crops, and management plans were prepared for many interested owners.

Under authorization of an act of Congress passed in 1891, many millions of acres of forest reserves had

CHIEFS of the U. S. Forest Service

been set up by withdrawal of lands from the public domain. The General Land Office of the Department of the Interior had charge of their administration. Congress in 1897 had passed an act prescribing a system of management for the reserves, but little was accomplished in the way of putting the system into effect during the next several years.

Professional training in forestry, meanwhile, was getting under way. Up to this time, the only professional foresters in this country were the few who had been trained in Europe. The need to train for-

HENRY S. GRAVES, 1910-1920

esters here was obvious; they needed to be trained in a way that would prepare them to cope with forest conditions in this country.

The first four-year professional curriculum in forestry was started at Cornell University in 1898; and in North Carolina, the Biltmore Forest School, a private school, opened the same year. Within the next seven years, schools of forestry came into being at nearly a dozen universities and colleges.

Such was the background of forestry effort that had been developing in the United States when the Forest Service was established in 1905. The Forest Service had strong backing from many individuals and groups, among them scientists, educators, civic leaders, and prominent lumbermen. There was a wave of popular sentiment to "save the forests." Gifford Pinchot, colorful and dynamic, was a prominent public figure. President Theodore Roosevelt was ardently championing conservation.

At the same time, the first attempt at management of the forest reserves in the West meant stepping on many toes. Establishment of the reserves was opposed by many who thought that resources needed for the immediate development of the country were to be locked up for an indefinite future.

But the forest conservation enthusiasts and the opponents of the forest reserves together made up only a small minority of the public. The great majority of the people understood little about our long-term dependence on the forests and other basic resources, and cared less. The greatest drawback to advancement of a national program for the conservation of natural resources was public indifference.

The act of Congress approved February 1, 1905, brought administration of the forest reserves (later to be known as national forests) under the Department of Agriculture. The federal government's responsibilities in public forest administration, in cooperative work with the states and with private owners, and in forest research were now grouped together in one agency. These three interrelated

WILLIAM B. GREELEY, 1920-1928

ROBERT Y. STUART, 1928-1933

and interdependent activities have continued to be the main fields of Forest Service work.

The change in name from Bureau of Forestry to Forest Service was provided for in the Agricultural Appropriation Act which became effective July 1, 1905. The real birthday of the Forest Service, however, came earlier in that year. It was the Act of February 1 that resulted in the present Forest Service organization and started it on the comprehensive program it has since carried on.

For most readers of the JOURNAL OF FORESTRY, who are professional foresters well acquainted with the history of forestry in this country, there is little need to give here a detailed, year-by-year account of the Forest Service's work. Many members of the Society of American Foresters have had a part in this work. I would like to aim at a broad picture of the Forest Service's first half century, and to point out what I believe are some of the significant contributions the Forest Service has made to American forestry during that period.

When the Forest Service began to apply scientific principles of forest management on the national forests, it was the first large-scale application of forestry practice in this country. There had been a few earlier attempts at forest management here and there—on some of the individual forest reserves, on state forests, and on some private estates and other private holdings. But these represented only a few thousand acres in total. Many of the early attempts by estate owners and others lasted only a short time.

On the day the national forests were transferred to the Department of Agriculture, guiding principles for the administration of the public forests were stated in a letter from Secretary of Agriculture James Wilson to the Chief Forester. The concluding lines of this letter of February 1, 1905, have been quoted many times. I believe a few lines from this letter will bear quoting again, because they express basic policies under which the national forests are still being administered today:

> In the administration of the forest reserves it must be clearly borne in mind that all land is to be devoted to its most productive use for the permanent good of the whole people and not for the temporary benefit of individuals or companies. . . .
>
> . . . Where conflicting interests must be reconciled, the question will always be decided from the standpoint of the greatest good of the greatest number in the long run.

EARLE H. CLAPP, 1939-1943

Management Problems

With a growing background of experience on the ground and of knowledge gained through research, the Forest Service improved its timber management, range management, watershed management, and fire control. Many methods and techniques now accepted as standard practice throughout the country were first tried out on the national forests. Large areas of burned-over land in the national forests needed planting, and the Forest Service did pioneer work in developing forest nursery and field planting techniques.

FERDINAND A. SILCOX, 1933-1939

One of the most difficult jobs was administering the grazing use. Before the western national forests were established, they were part of the unreserved public domain, and grazing was unrestricted. Many of the forest ranges were badly overgrazed. In attempting to bring about orderly range use, the Forest Service was working in what was then a new and largely unknown field.

Recreational use of the national

LYLE F. WATTS, 1943-1952

forests has multiplied many times over since the national forests were established. In the past fifty years, some 4,500 improved camping and picnicking grounds, thousands of miles of scenic roads and trails, and other recreation facilities have been provided. Some of the country's most popular winter sports areas have been developed in the national forests. The number of visitors has increased so rapidly from year to year that the Forest Service has been hard put to keep up with the demand for recreational use.

The Forest Service had a part in the development of modern game management. Few states had modern game laws or effective enforcement fifty years ago. Big game had almost disappeared from many national forest areas. The Forest Service encouraged establishment of nonpolitical state game commissions and cooperated with the states in restocking and game management programs. Work for the improvement and management of game habitat in many national forest areas has contributed to the development of game management techniques. State agencies and the Forest Service now cooperate in a large number of wildlife management projects.

Today the national forests are making substantial contributions to the economic life of the nation. Management of their resources is helping to assure permanence and stability for many industries and for the communities dependent on those industries. National forests are helping the livestock industry meet national needs for meat, wool, and leather. They furnish healthful outdoor recreation and vacation opportunities for millions; they provide the country's largest public hunting grounds and thousands of miles of unposted fishing streams. They protect watersheds vital to industry, agriculture, and municipal development over large areas of the country. Managed for the coordinated development and use of all their resources, the national forests are administered under a multiple-use policy which seeks to bring the greatest total of continuing returns in public services and benefits.

Federal-State Cooperation

From the beginning, the Forest Service engaged in cooperative work with the States and with private forest owners. The Weeks Act of 1911 established a regular program of federal-state cooperation to protect state and private forest lands from fire. This was later expanded under the Clarke-McNary Act of 1924. The Clarke-McNary Act also set up a federal-state cooperative program for the production and distribution of trees for planting on farms. Another section of this Act authorized federal cooperation with the states in farm forestry extension work. The Norris-Doxey Cooperative Farm Forestry Act of 1937 provided for federal-state cooperation in providing direct on-the-ground technical advice and assistance for owners of farm forests. This work is now carried on for both farm and nonfarm owners and for processors of primary forest products, under authorization of the Cooperative Forest Management Act of 1950, which superseded the Norris-Doxey Act. Under the Forest Pest Control Act of 1947, the Department of Agriculture is authorized to cooperate with the states and private landowners for the control of destructive insects and diseases attacking the forest.

To carry out its part of a cooperative deal, a state had to have a working forestry organization. The establishment and development of state departments of forestry therefore was given great impetus by the Weeks and Clarke-McNary Acts. When the Weeks Law was enacted in 1911, there were administrative units for forestry work in only about 25 states. Most of these operated on very small budgets. They had few technically trained foresters. Following enactment of the Weeks and Clarke-McNary Acts, these states rapidly expanded their forestry work. New forestry agencies were established in most of the remaining states. Today nearly all of the 48 states as well as Hawaii and Puerto Rico are engaged to a greater or lesser extent in forestry activities. Most of them maintain regular forestry agencies, under direction of technically trained foresters.

As a condition for federal cooperation, the states were required under the Weeks Act to provide by law for a system of forest-fire control. The Clarke-McNary Act authorized the Secretary of Agriculture to cooperate with the states only if they maintained systems of fire prevention and suppression which substantially promoted the objective of "protection of forest and water resources and continuous production of timber on lands chiefly suitable therefor." The effect of such requirements for acceptable standards of performance was to encourage the appointment of technically qualified state foresters and the employment of state forestry personnel on a nonpolitical, merit basis.

The cooperative programs thus helped the states to build up sound and competent forestry agencies with effective fire prevention and suppression organizations. Federal cooperation also encouraged the states to employ extension foresters, establish tree nurseries, and to develop on-the-ground technical services to woodland owners. Today the Forest Service cooperates with 43 states and Hawaii in the protection of nonfederal lands from fire. Of the 426,000,000 acres of state and private forest and watershed land needing protection, some 373,000,000 acres are under organized protection. Forty-three states, Hawaii and Puerto Rico are participating in the cooperative program for production and distribution of forest planting stock. The states now operate nearly 90 forest nurseries which last year distributed about 500 million trees.

Thirty-eight state forestry departments have programs to provide technical assistance to owners of private forests and to small sawmill operators and other processors of primary forest products. The State Extension Services of 45 states and one territory employ extension foresters who conduct cooperative farm forestry extension

work under section 5 of the Clarke-McNary Act. A number of states have enacted legislation which enables their state foresters to cooperate effectively in projects for the control of forest insects and diseases. Some of the states have been active in forest pest control work for a number of years.

Research

Long before the Forest Service was established, its predecessors in the Department of Agriculture were engaged in the study of forests and forestry methods. In fact, the first forestry efforts of the federal government were in the field of research. When Congress in 1876 provided for the appointment of Dr. Hough, the first governmental forestry agent, it was to "prosecute investigations and inquiries" concerning the forests and their products. For many years, fact finding was the principal activity of the Division of Forestry that grew out of Dr. Hough's work. Field studies were conducted in many parts of the country by members of the Division and of the Bureau of Forestry which followed it.

Three years after the Forest Service was created, it established the Fort Valley Forest Experiment Station in Arizona. This was the first of a number of field stations in the West. Although early research work at these stations was devoted primarily to problems in the management of the national forests, it produced a great deal of information that served as guidelines for the advance of forestry throughout the country.

In 1921, the Forest Service established a forest experiment station at Asheville, North Carolina, the first of several stations in the eastern states.

Meanwhile, in the West, the Forest Service had been cooperating with the Bureau of Plant Industry in studies of the management of native rangelands, and in 1915, the Forest Service was assigned general responsibility for range research in the Department of Agriculture. (In the reorganization of the Department of Agriculture by order of the Secretary, November 2, 1953, certain aspects of range research which were being done both by the Forest Service and by other units of the Department were consolidated under units of the Agricultural Research Service. The Forest Service continues to conduct research concerned with forest ranges and adjacent, integrated nonforest lands.)

Research on tree diseases and on forest insects were long conducted by other bureaus of the Department of Agriculture, although field units were attached to Forest Service experiment stations. In the recent reorganization of the Department of Agriculture the work in these fields was consolidated with other forest research in the Forest Service.

Research in the field of forest influences was started at the Wagon Wheel Gap Stream Flow Experiment area in Colorado in 1910. The Forest Service conducted the work on this area in cooperation with the Weather Bureau. Later, research on factors affecting runoff and water behavior was undertaken by the Forest Service at the Coweeta Experimental Forest in North Carolina, the San Dimas Experimental Forest in southern California, and at other areas. The work in this field has shed much light on the factors contributing to floods, and consequently, on methods of control. It has helped in the development of public policies for soil and water conservation. It has led to better coordination of other phases of forest and range management with watershed protection. And it is pointing the way to positive methods of watershed management for improved water yield.

The Forest Products Laboratory was established in cooperation with the University of Wisconsin in 1910. It was then the world's first institution devoted wholly to the study of forest products. It is still one of the leading institutions in its field. Every year the Laboratory gets some 70 to 80 thousand inquiries on wood utilization; three to four thousand industry representatives come to discuss technical problems; people from many countries come to learn about its work.

The Laboratory pioneered in the development of lumber kiln-drying techniques. Its investigations of glues and gluing contributed to advancement of the plywood and laminated wood industries; its studies of wood preservation helped to increase the usefulness of many wood products. The Laboratory's research on shipping containers has saved manufacturers and shippers millions of dollars. Its work in the fields of chemical conversion of wood and of pulp and paper making has led to important new commercial developments.

Research in the Forest Service gained new momentum when Congress passed the McSweeney-McNary Forest Research Act of 1928. This act recognized the vital need for sound knowledge in meeting the forest, range, and watershed problems of the country, and provided a charter for a nationwide program of research in all phases of forestry and wood utilization. Under its provisions, the Forest Service has developed a system of regional forest and range experiment stations to serve the principal forest regions of the country. Experimental projects under way in each region were brought together under a regional director, and the stations provided headquarters for coordination and development of region-wide research programs. The Forest Service now has in operation nine regional forest and range experiment stations in the United States. Under each of the regional stations are research centers, set up to meet the needs of particular areas or forest types. There is also a research center in Alaska, and a tropical forest research unit in Puerto Rico. Most of the research centers maintain one or more experimental forests or ranges, and much of the investigative work is done at these experimental areas, where problems can be studied and results tested on the ground.

The McSweeney-McNary Act also made provisions for a nation-wide Forest Survey of timber resources and requirements. Congress later authorized continuation of the survey in order to keep the information more nearly up-to-date. The

Forest Survey is providing information of great value to wood-using industries planning for long-term developments and to others concerned with public and private forestry programs.

The McSweeney-McNary Act was also a charter for cooperation in research. There has been more and more participation in forest research projects by state and local agencies, the forest industries, and other private groups. Many of the projects now under way at Forest Service research centers are cooperative enterprises. Local and regional advisory committees have helped the Forest Service plan its research projects for many years. Recently a National Advisory Committee was established to help provide a desirable balance and coordination in the research program. Pioneer work by the Forest Service laid the groundwork for much additional research now conducted by State agricultural experiment stations and other State agencies, educational institutions, the forest industries, and other agencies.

The Forest Service Family

If I have perhaps showed some lack of becoming modesty in writing about the organization of which I am now chief, I hope no one will think I have been trying to pat myself on the back. The contributions to American forestry that I have noted were the result of long-term accomplishments, of developments that began under the leadership of my predecessors long before I was assigned my present job. But I cannot help but admit to a feeling of great pride in the Forest Service. I am proud of its record over the past fifty years. I am proud of its high reputation for integrity, competence, and devotion to public service.

That reputation has been built up by the men and women of the Forest Service themselves — the rangers, supervisors, research workers, clerks. As a matter of basic policy in administrative management, the Forest Service has always delegated a large amount of authority and responsibility to its men in the field. Local decisions are usually made on the ground. Major decisions on policy matters generally result not from autocratic dictation from the head office but after free and frank discussion among Forest Service people and consultation with interested cooperators.

There are quite a number of Forest Service people, active and retired, whose careers spanned all or nearly all of the fifty years since the Forest Service was created. They were among the pioneers. They helped to build the foundations for American forestry.

Many other members of the Forest Service have since made major contributions not only to the progress of governmental forest work but to the advances of forestry generally in the United States. Many of those who achieved positions of prominence in state forestry, in forestry education, and in forest industry started their forestry work and gained their early experience in the Forest Service.

When in 1865 the Rev. Frederick Starr, mentioned earlier, advocated a government-sponsored program of forest research, he expressed doubts that the government itself could actually carry out any of the work. If the government were to attempt experiments in forest management, he said, the result would be failure "through incompetence or lack of interest in the men appointed to the work, from the short periods with which they would be connected with it, and the fact that they had no personal interest at stake in it except their salaries."

I think the Forest Service has abundantly demonstrated over the past fifty years that a government agency, operated with career personnel selected on a merit basis, can do a job competently and energetically, with integrity and public spirit.

What of the Future?

Whatever justification there may be for an agency to take note of its golden anniversary lies in the value that a look at past accomplishments might have in the conduct of future work. We of the Forest Service hope that a review of the accomplishments (and also the mistakes) of the past fifty years will help to point the way for the years ahead. We hope that it will stimulate in us a zeal for even greater accomplishment.

And we hope that observance of our golden anniversary will be of value not only to the Forest Service but to others. We would like it to be an occasion for calling attention to the contributions made to American forestry by the states, the forestry schools, the forest industries—by all who have had a part in it's development. We hope our golden anniversary will help the American people gain a better understanding of the importance of the forests to national welfare. We hope it will encourage greater progress in forestry, by all agencies, public and private, in the years to come.

I believe all of us in public and private forestry work will see big jobs and big opportunities for American forestry in the years ahead. There is still plenty to do. Even though timber growing practices have been adopted widely in recent years, we still have more millions of acres of potentially good timber-growing land that can be put to work. We can increase production perhaps two or three times by more intensive forest management.

Organized fire protection needs to be extended to some 50 million acres of forest land in this country that does not yet have it. And on many of the protected areas the degree of protection can be further strengthened to help assure more successful resource management.

Many areas of range land, both public and private, can be made to graze more cows and sheep, through better management, reseeding, or other improvement measures. There are many wildlife problem areas, and many places where game habitat management and timber and other resource management can be further coordinated. There is much we can do in the way of extension and improvement of facilities for recreation.

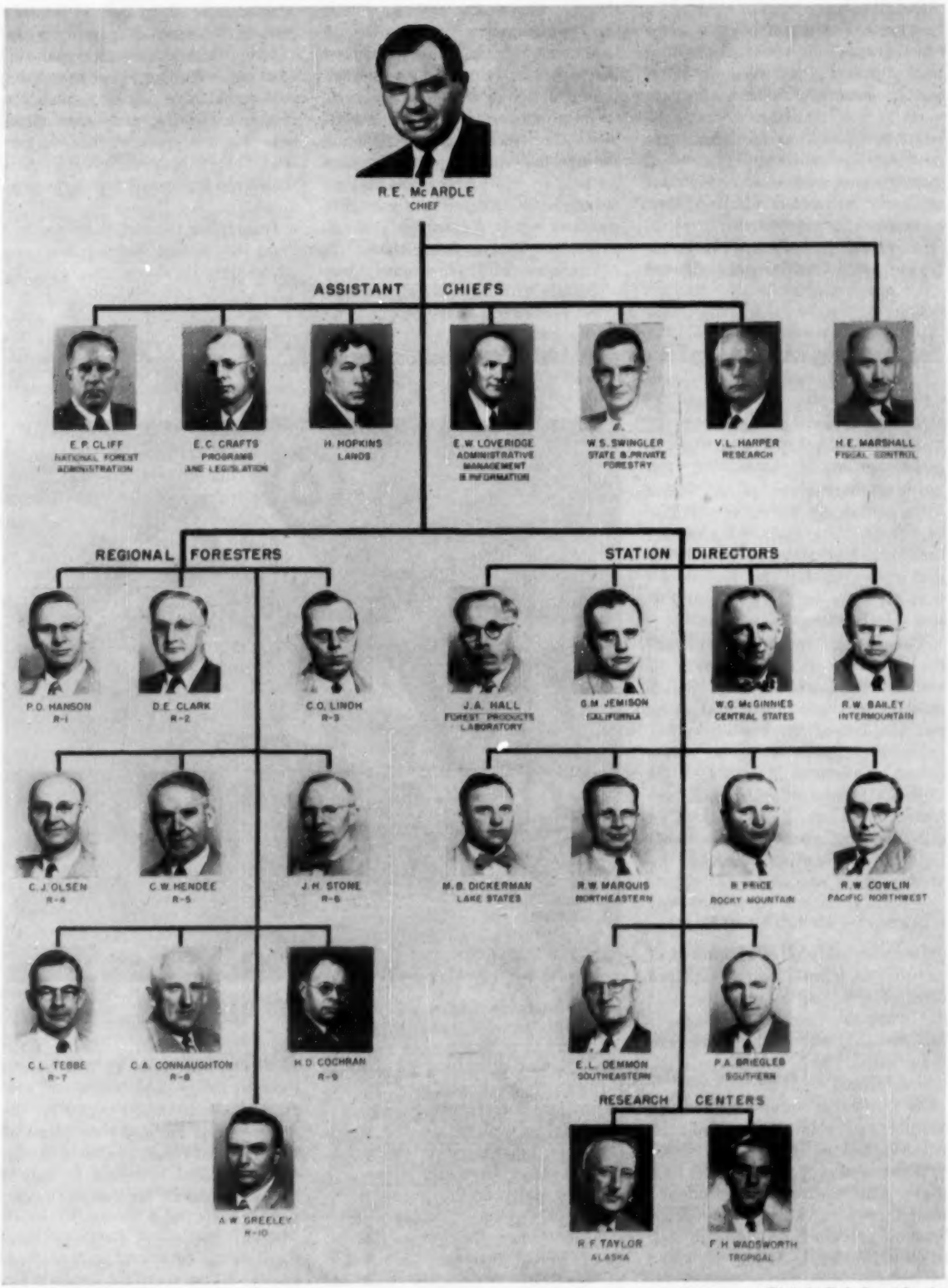

Photo by U. S. Forest Service

THE CHIEF'S STAFF, the regional foresters, and forest experiment station directors of the U. S. Forest Service.

Somehow we must meet increasing needs for water. Total water use increased six times in the first half of this century. In many parts of the country, further development of the local economy will depend primarily on increasing the usable supply of water. Watershed management is likely to be the most critically important phase of forestry work in many areas.

American forestry has continually improved and progressed over the past half century. It hasn't by any means reached a static condition now. Research and experience will keep on giving us new and better practices. Developments in chemical conversion and other wood utilization techniques may bring changes in the species and tree sizes we seek in our forest management. Advances in tree genetics may give us better kinds of trees, and change our methods of growing them.

The next fifty years offer more opportunities for foresters than the past fifty years. A rapidly growing population and an expanding economy will mean ever-increasing requirements for water, timber, recreation, wildlife, and other products and services of the forests. And this will mean greater need than ever for sound forest management.

In helping to meet these needs, I hope the Forest Service can continue to do its share.

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Some Highlights of Forest Research

V. L. Harper
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FEDERAL FOREST RESEARCH in the United States started with the appointment of one man in 1876. His job was to find out about timber consumption, timber for import and export, probable supply for the future, the best ways of preserving and renewing forests, and to report on same within one year! It was a tall order.

The Forest Service, established in 1905, is still working on these matters. In 1908, the Fort Valley on the Coconino Plateau in Arizona was the first of the Forest Service experiment stations to be established. Others followed soon in Colorado, Idaho, Washington, California, and Utah. In 1910, the Forest Products Laboratory was established in cooperation with the University of Wisconsin.

Increasing Breadth and Depth

In those early days a handful of men made simple tests, gathered dendrological or other data, and did what they could with meager facilities. Much of the work was designed chiefly to help manage national forests.

As time went on and trained researchers grew in number and competence, and as the forestry situation changed, important shifts took place. The research was broadened with increasing attention to problems on private forest land as well as on public lands. It was deepened to include more basic studies involving the various forest sciences. And, it was extended toward more ready application of results through pilot operations on experimental forests, ranges, and watersheds, as well as in the wood-products laboratory or manufacturing plant. Research became a major activity of the Forest Service.

Photo by U. S. Forest Service

HAND POLLINATING bagged pine flowers at the Institute of Forest Genetics, Placerville, Calif.

As of today, the Forest Service has a Forest Products Laboratory at Madison, Wisconsin, nine regional forest and range experiment stations in the United States, and smaller installations in Alaska and Puerto Rico. The research programs have been developed on the premise that the many problems of forestry and forest products are interrelated and can best be solved by simultaneous work on all major aspects.

Eight research divisions have been set up in the Washington office to guide and coordinate the work of the Forest Products Laboratory and the regional experiment

stations. Three are in the field of forest protection—insects, disease, fire; three in management—forest, range, watershed. One is in forest products, and one is in forest economics (including forest survey).

To Cope with Forest Pests

Forests, like all other living organisms, are plagued by natural enemies in the form of insects and disease. Undoubtedly, these agents serve to take out the weak trees from competition in the forest, permitting the more vigorous to attain their optimum development.

But with the encroachment of civilization—the clearing and cultivation of land, alterations in drainage, and other changes in the environment—the balance in nature has been upset and conditions have been created which are favorable for large-scale destruction by insects and disease. Then too, foreign pests have accidentally been imported which, though perhaps harmless in their native habitat, have become destructive here. Natural catastrophes in the forest also favor the build-up of pest epidemics.

Thus over the years insects and disease have made heavy inroads on timber, often nullifying efforts to increase and improve the stand. During 1910-1920 the spruce budworm killed 70-90 percent of the mature balsam fir and spruce in Maine and Minnesota; during 1924-1945 the western pine beetle killed one billion board feet of ponderosa pine *every year;* in 1947 the Black Hills beetle destroyed 15 million board feet of pine in South Dakota; in the same year the Douglas-fir tussock moth defoliated over 400,000 acres in Idaho; in the South, bark beetles alone have killed over one-half billion board feet of pine since 1948.

Losses due to disease are not so clearly evident but they are no less real: the chestnut blight, Dutch elm disease, western pine pole blight, littleleaf disease of southern pine, and oak wilt have caused heavy losses. Heart-rot fungi alone kill about 1½ billion board feet of saw timber annually.

While losses have been heavy, it is impossible to estimate the magnitude they might have attained had not control measures, developed through years of research, been applied. This has required thorough investigation of the insects and diseases, their identification, habits, host relationship, and susceptibility to control techniques.

Through such studies has come the development of control methods of three general types: (1) timber management techniques, such as the bark beetle vulnerability classification for ponderosa pine which helps foresters to recognize susceptible timber and mark it for harvesting before attack; (2) insecticide applications, best illustrated by spectacular control of the Douglas-fir tussock moth, spruce budworm, and gypsy moth by airplane spraying with DDT; and (3) biological control methods, such as the recent and promising use of virus diseases to control sawfly defoliators.

The future presents an even greater research challenge. Progress in forestry during the past decade has been encouraging; substantial areas of forest land have been placed under intensive management and heavy investments have been made for the future development of these forests. The protection of these investments has caused foresters over the country to focus their attention on insects and disease, not only on those noted above, but on the numerous obscure species which insidiously cause a drain on our forests.

There is no simple cure-all for the problem. We can never hope to exterminate the insect or disease enemy. But we should be able to do a great deal to prevent the development of large-scale outbreaks. The first and foremost need in this program is to determine the relation of the organism to its environment, and to determine the conditions it requires to attain epidemic build-up. This is a research job of no small magnitude.

Fire Problems Still Critical

The losses of timber by fire in the United States still add up to about $100 million annually. This loss is sustained in spite of the $68 to $70 million spent each year by federal, state, and private agencies for protection. To cut the losses and to buy more effective protection with control-funds is how research can help.

One of the most far-reaching protection aids has been the "fire danger meter." There are now approximately 1,500 fire-danger stations operating in the United States, of which 650 are in the East. These stations, maintained by the Forest Service, state foresters, military posts, and private outfits, collect data on wind-velocity, fuel moisture, relative humidity, temperature, and days since last rain.

The meter is used like a slide-rule to integrate such data and to indicate relative fire danger on a numerical scale. The danger measurements are guides to manning towers, manpower placement, crew organization, speed and strength of attack. They indicate probable rate that fire will spread and difficulty of control.

Without such scientific guidance, the $2 million a week that is spent on forest fire protection at peak periods would be much less effective. The meter readings are also combined in a running "build-up index," which shows the trend of diminishing or increasing hazard throughout the fire season. The index served as a guide to woods closure by governors' proclamation in nine instances in New England during the hazardous year of 1952. Reported daily by radio, newspaper, and police teletype, it can be an effective means of securing public awareness and cooperation.

A current project of much promise is concerned with "blow-up fires." These apparently are the ordinary fires that suddenly develop a whirl and burst out of control. They burn with an intensity far out of proportion to normal burning conditions; they are erratic; and they often get away. Though infrequent—perhaps 10 percent of all forest fires—they do 80 percent of the damage.

The leads recently uncovered by fire research workers in the Southeast illustrate the prospects. Investigators have observed that even on

calm days some fires behave in an extremely erratic fashion. It was discovered that a peculiar condition of atmospheric turbulence existed at such times. Cold air was overrunning a thin layer of warm air near the ground. When a fire starts, the rising hot gases "trigger" the release of violent whirling winds which sweep the fire out of control.

There is some indication that these conditions of turbulence are related to the atmospheric pressure system over a given area. If future study proves this to be true, atmospheric instability should be predictable one or two days in advance. Furthermore, morning measurements of the temperature variations through the lower atmospheric strata may provide an accurate indication of afternoon burning conditions.

Two other big forest fire problems on which research could profitably be done are (1) mass fire behavior and how to cope with such extensive conflagrations; and (2) lightning fires and their possible prevention through dissipation of thunder clouds. Both are problems that currently grip the attention of western forest-fire researchers.

Regeneration of Douglas-fir

Nowhere in the country has the wisdom of relying on basic research in forest management been more clearly shown than in the Pacific Northwest. At first it was thought that silviculture was simple enough if foresters just took their cues from direct observation of nature. Since many Douglas-fir seeds appeared to remain viable several years in the duff on the forest floor, it seemed that the original forest could be completely cleared, and that an acceptable new crop of trees would spring from the stored seed. Research showed this to be wishful thinking.

Again observing nature, young Douglas-fir was seen growing well in partial shade. This fact suggested partial cutting, so that natural seedfall would supplement the stored supply. But research revealed this method to be unsatisfactory, because Douglas-fir is not sufficiently tolerant of shade to reproduce itself adequately, and the more tolerant but less desirable elements of the stand gained the upper hand.

It is evident now that, even in this region of abundant moisture partial cutting fails to provide enough light to enable Douglas-fir to dominate the new growth. A careful study of shade indicates that reproduction of this species has little chance of successful establishment in anything less than 20 percent of full overhead light, even where there is no root competition. In fact, the species will not thrive with less than 50 percent of full light.

This discovery has led to the development of methods of stand regeneration through the use of clearcutting in small strategically located blocks—a system now widely used. Obviously, without research we would still be groping for some practical method of regeneration in the midst of numerous silvicultural failures.

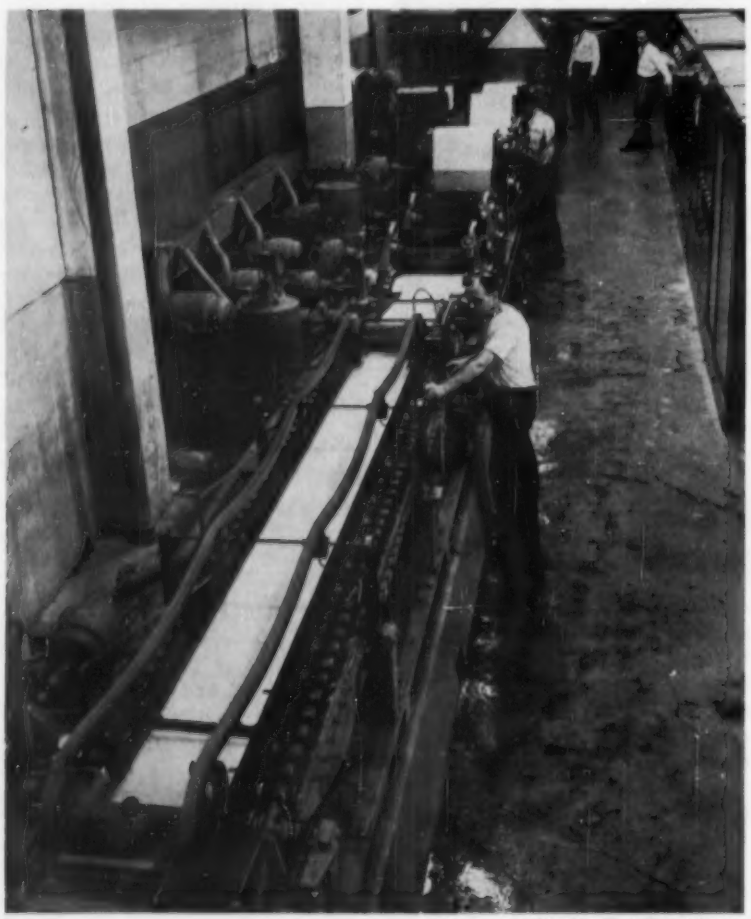

Photo by U. S. Forest Service

AN EXPERIMENTAL paper making machine at the Forest Products Laboratory, Madison, Wis. where research is carried on to develop uses for heretofore neglected tree species.

Naval Stores and Timber Too

Nowhere has research done more for a forest economy than in the naval stores region of Florida and Georgia. Painstaking studies of the effects of fire on forest soils, on forest trees, and on naval stores yields lifted the subject of the use of fire as a forest-management tool from one of bitter controversy to one of widely approved practice. Equally thorough, and over a longer period,

has been the research work on turpentining of longleaf and slash pine trees.

Along with fire, the working of such timber for naval stores used to be an exceedingly destructive practice. Now, the approved naval-stores practice takes much less labor in its application, wastes far less wood of the living tree, and results in a higher yield of gum. And current research, taking advantage of the great national variations of trees in ability to produce oleoresin, is well along on the trail of much higher yielding strains of naval stores pines through forest genetics and tree-improvement studies. Sustained research effort is paying off well in this forest-dependent region.

Restoring Western Ranges

The deteriorated conditions of much of the western range imposes many problems—low forage yields, poor watersheds, conflicts in users of public lands. An encouraging feature, however, is the remarkable natural recuperative powers of ranges that have not yet been wholly depleted. This is being demonstrated on several experimental ranges located in different problem areas.

Details of successful practices best for given range types differ widely but include as essential elements a reduction in number of grazing animals and better distribution of the grazing load. Experiments and demonstrations of this kind are helpful to forest and range land managers and carry weight with the livestock owners.

Technical Publications

A high proportion of forest and range management field research is done in areas and regions where distinct vegetative types and economic problems occur. Many experiments and laboratory projects, however, have more than local or regional value.

When brought together in appropriate monographs the results of such studies establish milestones along the path of progress and provide a base line for future work. A few examples are *Planting Southern Pine*, by P. C. Wakeley; *The Woody Plant Seed Manual*, by a group of forest scientists; *The Reproductive Habits of Douglas-fir*, by Leo A. Isaac; *Longleaf Pine*, by W. G. Wahlenberg; *Management of Ponderosa Pine*, by G. S. Pearson; *The Range Plant Handbook*, by W. A. Dayton; *Check List of Naturalized Trees of the United States*, by Elbert L. Little. These and similar monographs usually represent the culmination of many years of research by the authors and reflect the strength and help of a solid research organization.

Forests and Water

On most of the world's continents, rain-bearing winds coming in from the sea precipitate their moisture-burden when they strike the mountain ranges. It is so in the United States, and thus our national forests concentrated along the rough, untillable crests of the Appalachians, the Rockies, the Cascades, the Sierra Nevada, and the Coast Ranges become the nation's natural water reservoirs.

The problem is how to use these forest reservoirs for timber and forage production and still keep them in prime condition for water storage and sustained, regular flow. The need to face this problem becomes more urgent as population and water consumption increase.

A considerable body of knowledge has been built up on what takes place when vegetative cover is destroyed or removed from the soil. Ways have been discovered too for increasing usable flow, by reducing transpiration on the part of the forest, and by cutting methods that allow more snow to reach the forest floor.

A pertinent illustration of damage that ensues when watersheds are abused is furnished by an area 15 miles north of Salt Lake City. The farmland and townsites were settled about a hundred years ago on alluvial soil near the base of the Wasatch Mountains. Heavy summer storms were a normal occurrence producing only minor increase in streamflow.

But beginning about 1910 the streams began to carry larger volumes of water, heavily laden with mud, rocks, and other debris. In 1923 great quantities of mud and boulders spewed out of the stream mouths, causing heavy damage to homes, farms, highways, and irrigation ditches. People were killed. In some places the debris was so deep it could not be cleared away.

Other floods followed, and by 1930 accumulated damage amounted to $1 million. People were moving away and abandoning the land. To contour-trench and revegetate the 10 percent of mountain land where plant cover and litter had been destroyed by fire and excessive grazing cost $300,000. This 10 percent of the watershed, as research results and analysis indicated, was the source of the flooding. The cost of rehabilitation and the value foregone by present exclusion of grazing on the watershed are considered well worthwhile.

The floods have ceased. But none of it need have happened. It is not too much to hope that this sort of expensive disaster and expensive remedy can be headed off in thousands of locations. But as with most preventive measures—when potential damage is nipped in the bud or never allowed to develop—people are seldom aware of the accomplishment.

Logging Mountain Forests

On mountain lands the problem of skidding and hauling timber without gulleying and eroding the slopes is a common problem. As a result of watershed research, certain eastern national forests are now locating and staking out the best road plan before the timber is offered for sale. After the harvest, the exposed soil is seeded, water-bars and turnouts are maintained until the unsurfaced forest roads are safely put to bed to serve again in the future. This is a job that needs doing over wide areas of forest land.

In connection with harvest on steep lands, a promising trial is under way at the Rocky Mountain Forest and Range Experiment Station. Here the Wyssen skyline is about to be tested. This or some

other downhill cable logging system is expected to have numerous advantages. The greatly reduced road requirement minimizes erosion and should reduce costs considerably. In fact, on one experimental logging job, it was estimated that skyline cable logging would save about $7 per thousand board feet as compared with current methods, because 11 less miles of road were needed.

Perhaps one-third to one-half the remaining timber in Colorado will remain inoperable unless some such logging scheme can be developed for steep, rough country. This is a matter not only of logging economics but of safeguarding paramount watershed values.

Expanding the Pulpwood Supply

It used to be "common knowledge" among paper makers that only trees with long-fibered wood, like the spruces, balsam fir, and hemlock of the Northeastern and Lake States were any good. Short-fibered trees, notably hardwoods, just wouldn't make paper fit for writing or printing, let alone store bags and wrapping. The resinous pines of the South caused trouble in the pulping processes then used.

Consequently, the softwood forests of New England and the Lake States began to melt away at the same time the nation's demands for paper were mounting upward. Where the supply would come from was the concern of manufacturers and foresters alike.

And then, as often happens when supplies get short, research found a new source in southern pines through modified cooking and bleaching methods. The present vast complex of pulpmills developed in the South is in large part the result of these basic technological discoveries made by scientists at the Forest Products Laboratory.

Now, of course, tens of thousands of men are engaged in making paper from the formerly undesirable southern pines. Most of the pine timber holdings in the South are devoted in whole or in part to supplying pulpwood for the mills.

The technological conquest of southern pine was followed by the development of the semichemical pulping process which brought the hardwoods into the company of usable pulpwoods. Today paperboard containers, paper milk bottles, and many other products are made from semichemical paper.

Look to the Hardwoods

Increasing scarcity of softwoods readily accessible to the older mills has caused attention to be focused on hardwoods, many of which came in after removal of the softwoods. Annual consumption of hardwods for pulp and paper in the United States has increased more than fourfold during the last 15 years; from less than 1 million cords before 1935 to more than 4.3 million cords in 1953, or to 16 percent of total pulpwood consumption. By 1975, hardwoods may comprise from 25 to 30 percent of total pulpwood consumption.

Increased use of hardwoods is highly beneficial from a forest management standpoint. Up to the present, utilization has been concerned with natural stands which often consist of mixed species, of which only one or two are favorably accepted. Recent Forest Service research on utilization of little-used species and low-grade trees has indicated interesting possibilities for cropping natural stands more efficiently.

This could come about through new methods of pulping hardwood mixtures, methods of masking low-grade lumber with paper veneer, or through other ways depending on results of research and on industry development. Of great importance is the possibility that hardwood cull trees and weed species, occurring over extensive areas, may thus be removed from the forests at a profit. And we may as well face it and acknowledge that this is the only way such huge-scale, forest-management jobs can or will be done.

Teamwork in Research

An important aim of federal forest research is to stimulate research by or with others. Some examples will be illustrative. At the Southern Station's research center at Stoneville, Mississippi, bottomland hardwood studies had been carried on for several years. This work was of value to persons interested in hardwood production. They now participate in the work by making a substantial contribution of funds.

A group of paper companies in Maine formed a special organization and acquired an experimental forest which has been made available to the Forest Service for research under cooperative agreement. The State of California is making use of the accumulated results of research and specialized knowledge of the federal forest experiment station at Berkeley by contributing funds toward a new venture in wildland mapping—a soils and vegetation map of California's forest and range lands.

At its Forest Products Laboratory, the Forest Service now spends about $1 million annually. It also spends about $1 million from other federal agencies, chiefly on cooperative projects of importance to national defense.

Added to this are some $250,000 contributed by various companies on projects of special concern to them. But even more impressive are the additional millions of dollars spent in industry laboratories and plants building on and supplementing the research at the federal laboratory.

These are but a few of the many instances of teamwork in research effort. The large-scale cooperation now getting into high gear between federal research and such states as Georgia, Illinois, and Wisconsin is worth a separate article in itself.

Other Research Expenditures

In the early days, the Forest Service occupied the forest research field almost alone. Today, nonfederal agencies, public and private, spend considerably more on forest research than does the federal government, and they are increasing their spendings much faster. This is particularly true for forest utilization.

In 1940, the federal outlay for forest products research was a little

more than $500,000, whereas the nonfederal expenditure was a little more than $2.5 million. By 1949, the federal had increased to about $1.2 million annually, but the nonfederal had jumped to around $8.6 million, not including a much larger sum of some $40 million spent by industrial corporations on development research.

In forest and range production, the climb of nonfederal expenditures for research has been slower but also at an increasing pace relative to federal. In 1940, the federal funds appropriated for such research were a little over $1 million; the nonfederal expenditures were somewhat less than $1 million.

In 1949, the comparison stood at about $2.9 million for federal and $2.8 million for nonfederal. In 1952, it was $3 million federal and $3.5 million nonfederal. Led by forestry schools and agricultural experiment stations the nonfederal research spendings in forest production leaped ahead and the indications are that later estimates will show an even faster climb.

Broadened Participation

The policy of federal forest research is to encourage nonfederal effort in a number of ways. One approach is through the use of advisory committees, both at the national and field level. The purpose is better coordination between federal and nonfederal research, the stimulation of cooperative projects among agencies, and a wider participation in forest research by nonfederal groups.

Another approach is to favor cooperative projects by allocating new or released federal funds for those lines of research that will not only improve program balance but also call forth a maximum of nonfederal effort on needed work.

A further step forward was made in 1953 when Congress enacted a change in the agriculture appropriation bill permitting the Forest Service to make cooperative aid grants to stimulate and make possible research by others on problems of mutual interest. This should work well, particularly in cases where forestry schools and other units of universities have special instruments or laboratories, or men with research skills who can and wish to be part of a project.

It all boils down to *men* in the final analysis. Probably the most important accomplishment in these fifty years of effort is the expanding fraternity of forest researchers in America working for many different organizations. Fifty years from now the story of their work will be a long one indeed.

Rebirth of Dead Town

To the people of Morse, Wis. the national forest means the existence of their town. Twenty-five years ago the town was a thriving lumbering community. In the early 1930's the mill suddenly abandoned operations, and ten years later the new state highway by-passed it completely. From then on Morse was a dying community; its young people left for the city as soon as they finished school and empty business quarters fell victims to vandalism and storms.

A series of coincidences brought a business to Morse. A banker in a nearby town talked with a Milwaukee business man who said he needed a new source of Christmas wreaths to supply a market he had built up with churches and Boy Scout troops that resold them. The banker remembered this a few days later when he met a woodsman friend from Morse and asked him if he could help the Milwaukee man. The woodsman and business man formed a partnership in 1951 and turned out 11,000 Christmas wreaths.

Two years later Morse turned out 35,000. Further expansion is planned; 50,000 evergreen ropes for street decorations and carloads of boughs to be put on the open market at Chicago and St. Louis. At present the new industry employs 125 people—80 men in the woods cutting boughs and 40 to 50 women making them into Christmas decorations. Where does the Forest Service fit into the picture? The boughs come from the Chequamegon National Forest.

The National Forests Serve

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FOR THE FULL FIFTY YEARS of their existence the national forests have been providing services. When the Forest Reserves were transferred from the Department of the Interior to the Department of Agriculture in 1905, Secretary James Wilson set up a guiding prineiple which has been the basis of national forest administration ever since.

The part most often quoted is ". . . where conflicting interests must be reconciled, the question will always be decided from the viewpoint of the greatest good to the greatest number in the long run." But Secretary Wilson started that statement with equally important words. "You will see to it that the water, wood, and forage of the reserves are conserved and wisely used for the benefit of the home builder first of all, upon whom depends the best permanent use of lands and resources alike."

Following through with this policy, the Forest Service immediately issued a pocket-sized set of instructions for field men, entitled *The Use of the National Forest Reserves*, which became known as *The Use Book*. These humanized regulations contemplated localized use of the national forests, such as trails and roads for the local settlers, land for schools, churches, stores, stage stations, miners' camps, trappers' cabins, mills, hotels, summer cabins, grazing, farming, and steamboat and ferry landings. Also anticipated were such special uses as canals, ditches, flumes, pipe lines, tunnels, dams, reservoirs, railroads, and telephone lines.

The Use Book provided for free use of timber by individuals up to $20 worth, which at that time was enough to build a home, use of the range by the people who had been using the public domain for grazing, and protection of the forests against fire. Regulations for the sale of timber were set up, though the early administrators never fully foresaw the extent of such sales of the money they would bring to the federal treasury.

A Half-Century of Service

Through the years the services of the national forests have increased until today they affect just about everyone. Not only do the forests perform these small services, they contribute to a permanent supply of water, wood, and forage upon which the prosperity of a large part of the agricultural, lumbering, mining, and livestock interests depend.

From the beginning one of the greatest single benefits derived by the communities from the national forests was protection of the forage, timber, and water supplies from fire. Since 1905 that protection has come a long way. Most, although not all, forest land is under the organized protection of federal or state agencies or private timber companies, prevention has become a national slogan, and through research the techniques of fighting fire have improved.

The national forests paved the way for much of this progress. They systematized fire planning and developed the idea of the specialized forest fire fighting crew which is today common to most forest fire fighting organizations. They emphasized forest fire prevention, though it took the cooperative push of state and federal fire suppression agencies and industry through the Smokey Bear and Keep Green campaigns to make it an American by-word.

They also pioneered in improved forest fire fighting equipment. Men on the fire lines developed better hand tools. One combined the axe and the mattock into a single tool which is called the Pulaski. Others later made such contributions os the flapper, the fire rake, and the McCloud tool. They followed up with the development of mechanized equipment—the "ranger pal" plow and the Bosworth trencher, to mention two. Today they are working on improvements in the trencher and light-weight, gasoline-engine-powered hand tools for brush clearing and trenching.

It was the Forest radio laboratory at Portland, Ore. which built the first radio to show promise for use in fire fighting and subsequently developed it into a practical piece of fire equipment. It was Tom Pearson who in 1931 dreamed up the idea of parachuting to fires from which evolved the present-day smokejumper crew of some 265 men. The value of the timber they saved by getting to remote fires while they were still small proved the dream to be no idle vision. Over the years the contributions of the national forests to the country in forest fire fighting have been numerous and varied.

Watershed Benefits

The most important resource produced and protected on the national forests is water. In the 11 western states these lands comprise 21 percent of the total area; receive 32 percent of the total precipitation; and furnish 53 percent of the total annual runoff.

They are on the headwaters of many large river systems. The Central Valley project of California is fed by streams rising in the national forests along the western side of the high Sierra. The Colorado draws from streams originating in 25 separate national forests on the west side of the Rockies in Nevada, Utah, Wyoming, Colorado, New Mexico, and Arizona. Tributaries rising in some 35 forests extending from Montana and Wyoming through Idaho, Nevada, Washington, and Oregon make major contributions to the water supply in the Columbia River. Likewise mountain streams on forests in Colorado and New Mexico are the primary sources of water for the Rio Grande. On this watershed national forests produce about 80 percent of the water while

they occupy only 11 percent of the area.

The mighty Mississippi River system draws heavily from the national forests through its three main branches, the Missouri, the Arkansas, and the Ohio. The first two rise in the West along the eastern side of the Rocky Mountain backbone in a series of national forests extending from northern Montana to southern Colorado. The Ohio, formed by the Allegheny and Monongahela Rivers which originate on national forests by the same name, is also fed by the Tennessee which rises in the national forests along the west side of the Southern Appalachians.

Streams originating on the national forests furnish water for over 13 of the 21 million acres of irrigated land and 600 power developments. Some 1,800 towns and cities depend on the same source for their drinking water and industrial supply.

The Timber Resource

Although watershed protection receives first consideration in all plans for national forest use, the timber resource serves the people too. It helps stabilize the economy of towns dependent upon wood using industries by providing a steady supply of raw material.

Typical of towns so aided is McCall, Idaho. Though summer recreation raises the 1,500 winter population to nearly 5,000, the main source of income is the Brown Tie and Lumber Company, which has been operating since the forest supervisor's office was established there in 1914. About 250 of the year-round residents or 40 percent of the employable people, work in the woods or in the mill. Of the 25-30 million board feet of timber the mill uses each year, about two-thirds comes from the Payette National Forest. Already a second generation is managing the mill, and as far as the national forest timber supply is concerned, many future generations can operate it.

Thousands of such towns depend on national forest timber. In the area of the Kootenai National Forest in Montana two-thirds of the income is from forest products. The biggest operator is the J. Neils Lumber Company which gets enough timber from the national forest on competitive bid to supplement the supply from its own forests and keep its plants going full time. The Coconino National Forest in central Arizona supports two large sawmills which employ 500 people as well as other wood using industries. In north central Minnesota the Chippewa National Forest, unproductive when bought in 1923, now helps support 37 small mills.

Wherever the timber resource warrants it, the national forests encourage the development of new industries. The Tongass National Forest in Alaska, for example, contains enough timber to allow an annual cut which would support five or six large sales. As yet only two large ones have been made. One pulp plant has been established which produces 300 tons of pulp daily, and provides employment for 300 people in the mill plus another 300 in the woods.

The Pacific Northern Timber Company recently received the preliminary award for the second sale

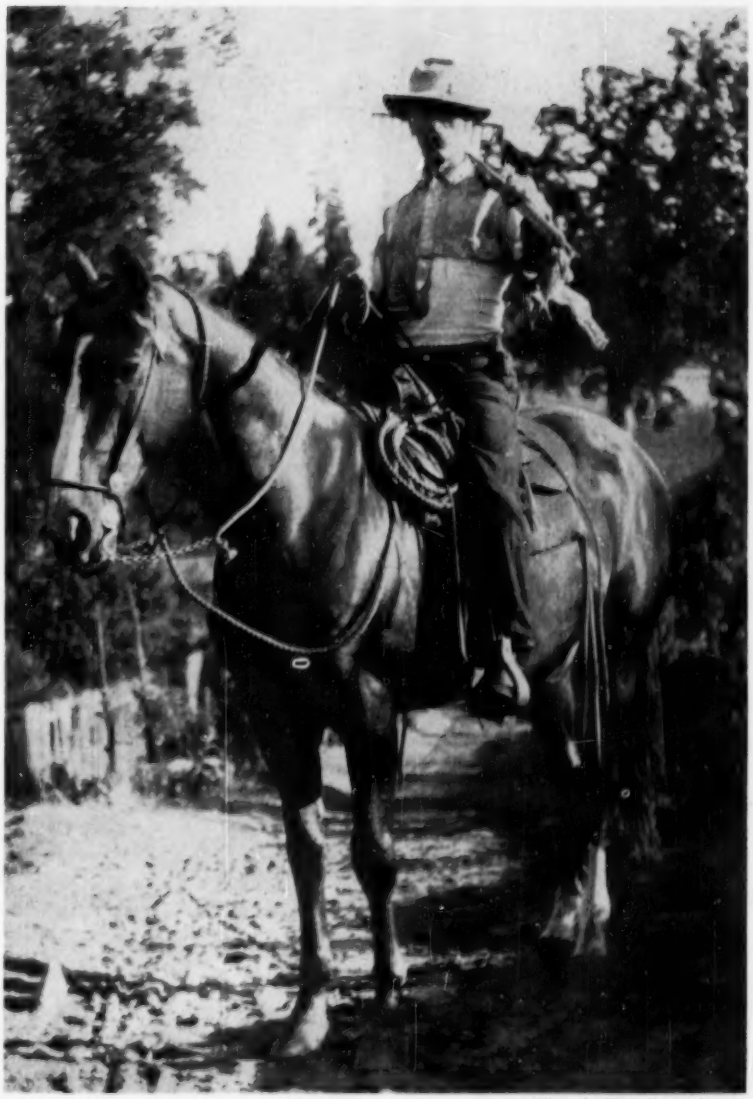

Photo by U. S. Forest Service

FIRE FIGHTING in 1908. Ranger J. J. Westfall after fighting fire for two days and three nights on the Sierra National Forest in California.

Photo by U. S. Forest Service

FIRE FIGHTING mechanized. A two-disk plow with trailer transport. Francis Marion National Forest, South Carolina.

near Wrangell. This sale will support a sawmill, plywood mill, pressed board mill, and a small pulp mill. Five or six such sales would go a long way toward establishing a permanent economy in southeast Alaska, something the Territory has never enjoyed.

Last year the national forests made 24,000 separate timber sales to individuals and companies, totaling 5.3 billion board feet, or 10 percent of all the timber used. They could have furnished 6.9 billion board feet to industries. As burned-over and cut-over lands are brought into production, the allowable cut will increase even more.

Range Forage

Public land forage, that all important resource over which sheepmen and cattlemen fought at the turn of the century, always has been recognized by the national forests as vital in the economy of the West. Some 1½ million head of cattle and 3 million sheep graze the national forest ranges each year. These ranges, covering some 70 million acres, furnish about 7 percent of the total livestock feed requirements. National forest grazing permits are distributed among 23,000 livestockmen who depend heavily upon them.

On the typical ranch the national forest range is used only during the summer months. While his stock is grazing these high mountain ranges, the owner is using his valley land to raise hay for winter feeding. As fall approaches, he drives his stock to the foothills which he may also use for spring grazing. Finally the stock arrives back at the home ranch for winter. Except on the lower elevation and warmer ranges, as in the Southwest where animals commonly graze year-round, this is the cycle of livestock movement.

Because the forest range lands also yield large supplies of water to western irrigation farming, they must be so managed as to protect this resource too. Establishing the proper balance between grazing and other land uses so that all interests will be taken care of is one of the major responsibilities of the national forests.

To date over $18½ million has been invested in range improvements to develop, manage, and protect these resources. The improvements include 29,380 miles of fence, 3,000 miles of stock driveways, and 17,791 water developments. Also 547,932 acres of worn out range has been reseeded at a cost of $4,498,618.

Recreation

The Use Book authors probably did not anticipate the part national forest recreation would play in the well-being of individuals and the economy of communities. More than 35 million visits were made to the national forests in 1953 by people looking for simple forms of outdoor recreation.

Nature endowed the national forests with one-third of the big game of the country, 81,000 miles of fishing streams, and 1,500,000 acres of natural lakes, while man has added 635,000 acres of impounded water. With the exception of a few game preserves all 181 million acres of national forests are open to hunting and fishing under the fish and game laws of the states in which they are located.

To make the stay of the recreationists more pleasant the national forests have provided 4,398 improved camping and picnicking grounds, 208 winter sports areas, 191 swimming places, and 119,914 miles of trail for hiking and horseback riding.

They have set aside 78 wilderness, wild, and primitive areas for those who want to get completely away from the auto horns of the

road and the jangle of the telephone. In these areas there are no roads, no timber cutting, and every effort is made to preserve primitive conditions. For those with more leisurely recreation tastes, there are on the national forests 133,920 miles of roads which offer an attractive and at times spectacular environment.

Permits for 15,520 summer homes have been issued in areas where such private use does not interfere with more important public use. There are also 600 resorts offering reasonably-priced accommodations.

Recreation brings tremendous income to the communities and the states through the sale of fishing and hunting licenses, sporting equipment, gazoline for cars and boats, and food. The recreationists patronize nearby hotels, motels, lodges, and dude ranches. They visit local gift shops, craft shops, attend square dances, sleigh rides, or carnivals. In some areas they hire guides, pack horses, and canoes. The skiing on surrounding national forest slopes brought the ghost towns of Alta, Utah, and Aspen. Colo. from the grave to fame and prosperity.

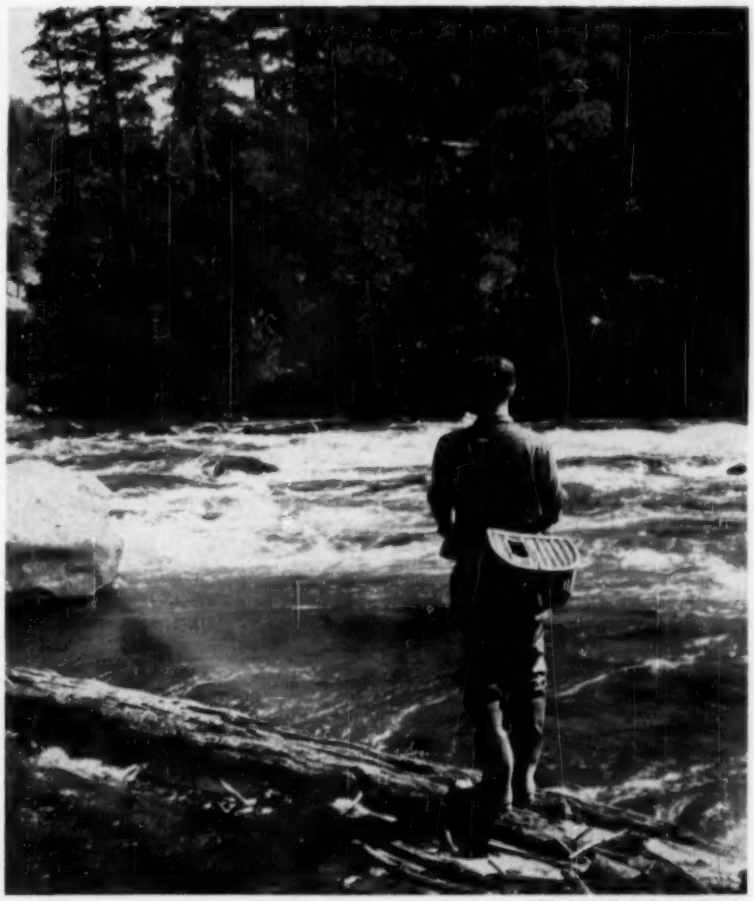

Photo by U. S. Forest Service

WATER—for agriculture, for domestic and industrial use, and for recreation—is probably the most valuable product of the national forests.

Other Services

The national forests provide many other services, also undreamed of by their founders. Private companies may develop the mineral resources of the old public domain lands under the provisions of the mining laws. National forests contribute 25 percent of their total receipts to the states for use of public roads and schools in the counties containing national forests. For fiscal year 1954 this amounted to $16,393,583.27.

The services of the national forests have expanded through the years to meet the growing needs of the people. Towns and individuals still can call on the forests in times of emergency and get quick help, just as they did in 1905. The forests, however, went on from local use to pioneer in many phases of resource management. They not only initiated improvements, but opened up for regulated use all the resources within their boundaries.

As the population of the country rises and the demands on the timber, forage, and water resources increase, the national forests more and more provide for the material needs of the individual, aid the economy of the towns and states, and contribute to the nation's strength and well-being. Thus the national forests serve the people.

Goddard Secretary of Pennsylvania Department of Forests and Waters

As this issue of the JOURNAL went to press, we learned of the appointment of Maurice K. Goddard, director of the School of Forestry, Pennsylvania State University, as secretary of the Pennsylvania Department of Forests and Waters, Harrisburg, Pa.

A forestry graduate of the University of Maine in 1935, Goddard received the M.F. degree from the University of California in 1938. He went to Penn State in 1935 as an instructor. Last year the Department of Forestry of which he had been head since 1950 was raised to the status of a school.

The U. S. Forest Service, 1905-1955: An Industry Viewpoint

Geo. L. Drake
Forest consultant,
Tacoma, Washington

THE OCCASION of the fiftieth anniversary of the establishment of the Forest Service certainly marks an era of many accomplishments. During this period tremendous forestry advancements have been made by governmental forestry organizations and by private industry. There has been a great upsurge in conservation thinking on the part of the general public, fire losses have been reduced to reasonable proportions, cooperative action on insect and disease control has developed, management practices on governmentally owned and privately owned forest lands have made marked progress, and the degree of utilization of wood material through logging and in milling operations has shown steady improvement.

The early initiative and encouragement on the part of the Forest Service in all these fields can be credited with much of the advancement to today's forestry practices; with individuals in the federal forestry agencies, in state forestry organizations, and in private forest industry rightfully assuming their place in the developments that have come about. Controversy and sometimes bitter recriminations have been the anvil on which much of today's advanced thinking has been forged.

In presenting the industry viewpoint with regard to the Forest Service on its fiftieth anniversary, the writer emphasizes that the comments present his personal viewpoint although through contacts over the years with other members of private industry, in many parts of the country, he feels many of the points raised represent their considered thinking. These statements are also based on great respect for the Forest Service as an agency of government and for the many outstanding employees who have devoted their lives to better forestry in this country.

The rule of any governmental agency should be that of service to the citizens of the legal subdivision represented and to the industrial segments important to the fields with which it is concerned. The outstanding accomplishment of the Forest Service during the past fifty years has been in this service function. Through this function impor-

Photo by U. S. Forest Service

MUCH OF THE LOG VOLUME consumed by the J. Neils Lumber Company of Libby, Mont. comes from the national forests.

tant benefits have accrued to the forest industries.

National Forest Uses

Since 1905 the national forests established by presidential proclamation have been a tremendous factor in all forestry development. The nation has been slowly swinging from what might be called old-growth forestry to second-growth forestry, with the national forests today providing a backlog of old-growth timber which has been, and will be, of material assistance to the forest industries in making this transition. In recent years timber sales have been substantial stabilizing factors to much of the industry.

In the early years the national forests also provided a proving ground for many economic management and utilization practices which have now become a part of daily operation on all forest lands. The national forests have also provided, through dealings between buyer and seller, an early forestry schooling for many lumbermen who did not at first realize the possibilities of growing trees for future crops.

The advancement of technical forestry education in the institutions of higher learning in early years was almost synonymous with the development of the Forest Service. Until the late 1930's most technically trained foresters found employment with the federal forestry agencies, principally the Forest Service. Many prominent industrial foresters of today received their early practical experience in federal forestry work. The outstanding level of technical forestry training is undoubtedly due to a considerable degree to the demand for technically trained graduate foresters generated by the forest conservation movement, expressed through the activities of the Forest Service. This was the foundation on which American forestry was established.

State and Private Cooperation

For four decades a direct relationship with private industry has been carried on by the Branch of State and Private Forestry as an organizational part of the Forest Service. The passage of the Clarke-McNary Act of 1924 made cooperation truly meaningful as a service to all interested in forestry, particularly with regard to forest fire control and fire prevention. Until adequate forest fire control measures were established, the holding of forest land and the management of new crops of trees for the future could not be justified on an economic basis. Through appropriations under Section 2 of the Clarke-McNary Act and through initiative, encouragement, and counsel by Clarke-McNary inspectors, state forestry organizations were assisted in their drive for greater effectiveness. This leadership by the Forest Service and the insistent demand and participation within the states on the part of private industry resulted in phenomenal advancements.

With the advent of more adequate fire control measures and the change in the economic structure of the country, the need for reforestation of denuded areas has become increasingly important. Today annually, millions of acres of idle forest land are being planted with stock produced in the main by state and private forest nurseries. Here again the Forest Service provided the early initiative and encouragement to the states to establish state forest nurseries, which provided the nucleus of experience around which today's extensive forest nursery systems, both state and private, have been developed.

Another field in which the Branch of State and Private Forestry has been an important factor has been that of the encouragement of management advice to the thousands upon thousands of small woodlot owners. Working with its own personnel, and in more recent years through the state forestry agencies, the Forest Service stimulated real progress in this important area of industrial wood supply. While there is much yet to be done, all state forestry organizations are active in this field, as well as private industrial foresters and consulting foresters.

Role of Research

One of the most important service functions of the federal forestry agency has been in the field of research. Wood is a product that has always had an accepted market. Because of this, and because production was the output of thousands of small scattered units, with few exceptions there was little merchandising or development effort which usually accompanies the establishment of a major industry. Apparently, inexhaustible resources and extremely low stumpage values were not encouraging to the need for intensive forest management research. Realizing the need for wise use of the forest resource, the Forest Service encouraged the development of research activity and carried the initial load.

The establishment of the Forest Products Laboratory at Madison, Wisconsin, was an outstanding milestone in wood products research. Dealing in fundamental wood science such as the basic mechanical properties of wood timbers, and delving into such things as kiln drying techniques, the uses of many species were expanded into a wide variety of fields which had not been thought possible. The laboratory also determined the pulping qualities and yields for many species which pulp processors had never used, thus opening new areas for the establishment of long-term pulp and paper manufacturing plants. These research developments, coupled with those of private industry, made possible the establishment of integrated manufacturing plants and a high degree of utilization in the forest because of the ability to use many more kinds of woods, and all of the wood.

The enactment of the McNary-McSweeney Act of 1928 provided for the establishment of forest experiment stations in each of the major forest regions of the country. These stations through their research in the field of forest management brought to private industry many possibilities for better utilization of the timber resources and the practical development of management practices for the growing of successive timber crops.

Of paramount importance as a service to the industry was the development by the stations of timber inventory statistics through the Forest Survey. Although conducted on an extensive basis, the Survey has served industry well as a background on which it could develop its management, manufacturing, and marketing plans. Revision now in progress in the light of changing economic conditions is showing an appreciable increase in the amount of available timber in nearly all localities. The Forest Survey would not have been possible of attainment at the time of its inception by any other organization.

The forest industries are also appreciative of the many other service elements through which the experiment stations have made major contributions. Research and publications on forest taxation, fire control, second-growth management, small woodlot forestry, insect and disease control, cost studies, and a host of other pertinent factors have all been important in placing in the hands of management the broad basic facts necessary to the intelligent direction of a forest business.

A Time for Review

The accomplishments of the U. S. Forest Service have been notable. They are such that anyone connected with the Service and its activities can take pride in this fifty-year celebration. A golden anniversary, however, would not serve its full purpose if the occasion were not also used for reflection on past accomplishments, lessons learned, and projections into the future. It should also be a period for critical review of present day activities, basic philosophy, organization structure, and of the course that is to be taken for the further advancement of private and governmental forestry.

It is important to realize that individuals and organizations need inspection, review, and criticism if they are to maintain a high standard of efficiency and the respect of those with whom they must deal. Constructive criticism properly accepted and carefully weighed can be a most powerful tool in public and personnel relations.

With this in mind the following critical suggestions are offered with regard to the direction that should be taken in the development of a cooperative approach to the forestry problems facing both private and governmental forestry agencies. Private forest industry, generally, believes rather strongly that the Forest Service should direct more of its attention in the future to the administration of the national forests, with correspondingly less emphasis on many other activities that have been engaged in to date. With the present status of American forestry and the continued progress that is indicated on private and state initiative, future participation of the federal government in allied forest activities should be limited to direct federal responsibility in the public interest.

Of primary importance is the development of access road systems and timber sale activities to the maximum of the allowable cut of each national forest and of each working circle. Such administration would intensify the development of proper relationships between the growing of timber for product utilization and the use of land for recreation, wildlife, watershed, and other multiple uses. The achievements already obtained in national forest management need to be strengthened materially in the light of the increasing importance of these forests in the overall economy of the nation, and as the balance wheel in our change from old-growth management to second-growth management. Particularly outstanding is the need for more adequate financing and handling of problems involving insect and disease control on federally owned forest lands. While lack of funds has been the principal reason for delayed action in these fields, which have developed into several notable epidemic infestations, concentration on the administration of these lands would assist in the discovery of the incipient stages and in the obtaining of funds for cooperative control action.

Field Authority

Emphasis on national forest administration should also involve a review of organizational development and function. The great strength of the Forest Service throughout its early organization was the emphasis on its field activity and field authority.

As the organization has grown, there has been a tendency, like in many other expanding governmental agencies, to concentrate authority in Washington, to the detriment of administration at the local level. Greater delegation of duty and authority to the local men would make the Forest Service administration much stronger and more effective in its tree root contacts.

In his book, *Forests and Men*, W. B. Greeley points out that in his attempt to sell forestry to "rebellious lumbermen" he moved a great deal farther by taking them out on the job. Forestry is primarily a task of field acomplishment. Its effectiveness and its benefits can be sold "on the job" only if the man doing the selling has the authority for decision "on the job." There is no better place to sell forestry than in the field.

This very important concept of field authority demands the maintenance of a clearcut line and staff organization. Tremendous growth in function and personnel during the depression and World War II has caused many organizational developments that are not completely sound.

It has been suggested as fundamental that there be established a single line of authority between heads of each level of administration. Staff positions in fire control, forest management, timber sales, fiscal control, etc., should be maintained as advisory positions to the national forest supervisor, and to the district rangers without command functions. This would also apply to the staff positions of the regional forester and to those in the Chief's office in Washington, D. C.

Research Needs

Another field in which the activity of the Forest Service should be intensified is that of research. With this intensification should come a new delineation of research function, both in forest manage-

ment and in product development.

Private industry is slowly coming of age with regard to research, and a recognition of proper fields of effort cannot help but encourage this progression. The experiment stations and the Forest Products Laboratory should concentrate on fundamental or basic research, with applied research being the responsibility of industrial organizations.

While it is to be recognized that there is not always a clear line between fundamental and applied research, concentration primarily on fundamental factors by the governmental organizations would make easier the obtaining of funds with the full support of industry and would provide a much wider variety of basic facts on which applied research must depend. Typical is the need for greater concentration on the revision of the Forest Survey statistics so that up to date inventory facts on timber supply will soon be available.

Public Understanding

The Forest Service occupies a unique place among the conservation groups, which include many sincere nonforest people truly interested in conservation as they understand it. As the accepted national authority in this field, the Service has a responsibility to define clearly conservation terms, to provide proper direction, and to correct false impressions when they occur.

Most conservation groups interpret the word as "preservation," rather than "wise use." They assume "multiple use" is solely a by-product of federal ownership rather than the natural development on any well-managed forest property.

Some advocate forest practices that no sound, trained forester would accept as practical. These and many other misunderstandings demand explanation and interpretation on a factual basis. The Forest Service has a responsibility to help correct these misunderstandings.

The Regulation Issue

Federal regulation continues to be a point of suspicion accumulated over the past twenty years of strong advocation. The lack of conclusive statements and action to the contrary leads to the belief that the matter is merely quiescent for the time being. A searching look at this entire subject is important to all connected with forestry.

The drive for federal regulation is not new. It was initiated by Gifford Pinchot and has risen and fallen as regularly as the tide ever since. "Timber famine" and "timber baron" were phrases used in all sincerity to sell such legislation to the public and to Congress. Today it is an accepted fact that large forest properties, and many small ones as well, are being managed under accepted principles of good forest practices. These properties for the most part were in the "timber baron" class of yesterday's references.

The two outstanding problems presently facing American forestry are insect and disease control, and cutting practices on small forest properties. The Forest Pest Control Act (Public Law 110) and subsequent action have established a pattern of cooperative approach in the first. What should be the approach to the second?

The Clarke-McNary Act, for a time, set to rest the controversy over regulation. Its passage established the idea of three-way cooperation of federal, state, and private owners as the principle for progressive forestry action. In spite of marked improvement in cutting practices, partially as a result of the industry's NRA code and the continuation of adherence to this code even after it was declared unconstitutional, the drive toward federal regulation again became a sharp issue in the late 1930's and was whipped into a controversy in subsequent years. While defensive action played a part, through all of this controversy forestry education has continued and this educational and cooperative effort has paid off in sound forest practices in spite of the fact that federal regulation has failed to become law.

Is it not logical to assume that an intense cooperative effort, again on the three-way pattern, with education the core of the attack, will provide the same results in the field of small private ownerships? Regulation where necessary should be the responsibility of the states.

The philosophy of the Forest Service with regard to federal forest land ownership should be reviewed from a standpoint of better over-all forest land management.

Conclusion

The fiftieth anniversary of the U. S. Forest Service is a memorable occasion. It finds this country on the threshold of technological and economic potentialities that augur well for the future of the forest industries and for governmental forestry agencies. There is a need for honest appraisal on the part of all with regard to the redevelopment of a true cooperative approach to the forest problems.

The Service is a necessary balance wheel to the drive of certain industrial and conservation groups. The forest industries are an essential element in our national economy and a necessary checkmate to socialistic trends in government.

A complete and honest approach eliminating personal prejudices in areas of common agreement and of disagreement is absolutely essential of the forest conservation objectives of this country are to be realized. The Forest Service, operated on the basis of sound principles of organizational procedure, a true assessment of its place in the entire forest picture, a willingness to state positively its position, and a vigorous approach to all problems, can become a much more powerful influence for good in forestry.

The forest industries are proud of the part they have played in

forestry progress in the past fifty years. They recognize the outstanding contributions of state forest agencies. They congratulate the U. S. Forest Service on its remarkable history of influence and accomplishment in progressive forestry development. They look forward to a new era of positive three-way cooperation between federal, state, and private forest organizations.

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Services to the Public Through Cooperation with States and Private Owners

W. S. Swingler
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BEFORE THE TURN of the century (in 1898) the Division of Forestry issued Circular 21 which outlined the terms under which it would cooperate with private landowners in promoting better forest management. In 1905 when the Bureau was changed to Forest Service and the appropriation act directed it "... to advise the owners of woodlands as to the proper care of the same ..." the Forest Service was given authorization to engage in "service" activities.

In his report for 1905, the first Chief, Gifford Pinchot, stated:

> During the year 167 applications were received for advice and assistance in the management of private forest lands. ... The most notable phase of the cooperative planting work during the year has been the increasing requests for asistance made by cities, water companies, railroads, and other large owners.

By "assistance" Pinchot evidently meant an examination of their lands and a plan for the job because at that time there was no federal money available for the production of planting stock.

Management assistance and cooperative planting were just two of the ways in which the Forest Service helped forest landowners. The entire organization was—and is—dedicated to service to all the people. All parts of the Forest Service, including branches dealing with research and lands, were directed to help the private owners of woodland. A good neighbor policy between the ranger and local forest landowner was the rule. Private owners of woodland would visit the neighboring forest preserve to see how the ranger marked the trees, measured them and made his sale. From this beginning the Forest Service has been concerned with all the forest land in the nation—not only the federal lands which it administers or the farm woodlands which are the special field of the Department of Agriculture.

With *service* as the main objective, the policy of the Forest Service has not changed in the past fifty years although emphasis on various functions and techniques has changed in conformity with national needs. For example, fifty years ago it seemed more important to use the few forestry technicians in helping the states and big landowners with the proper management of forest land. Now with many states and large landowners doing a splendid job, the major concern is the 4¼ million small landowners.

At first the Forest Service made assistance available direct from Washington. As state forestry organizations developed, the Service adopted the policy of working with and through the state foresters.

Protection from Fire

The Forest Service grouped its functions in three specific categories: national forest administration, research, and state and private cooperation. The state and private cooperative work developed along the functional lines of planting; assistance in management and flood prevention; and protection from fire, disease, and insects.

The federal-state cooperative fire program actually started in 1911 under the Weeks Law which authorized the Secretary of Agriculture to cooperate with the states in giving protection from fire to nonfederal lands on watersheds of navigable streams. Sixteen states had already established organized fire protection and 11 states then joined the cooperative program. In addition, a number of private protective associations were protecting private timberlands in the Northwest, but their efforts were not a part of the cooperation under the Weeks Law.

From 1911 to 1920 federal patrolmen were employed in the states to work along with state patrolmen. When in 1920 this system was changed, federal funds were allotted directly to the states to reimburse them for a part of their expenditures. This policy continues. The states because of this added responsibility strengthened their protection effort and each year additional new areas have been placed under organized protection.

In 1924 the Clarke-McNary Act was passed. This Act gave the Secretary of Agriculture broad authorization to cooperate with the states and through them with private and other agencies in protecting nonfederal lands classified as timber lands and watersheds yielding water for domestic use or irrigation. States already cooperating under the Weeks Law were further encouraged to intensify their protection, and other states were stimulated to enter the program. Forty-three states and Hawaii now participate in it.

There has been steady progress in the thirty years of cooperative protection under the Clarke-McNary Act. The annual report for 1924, the year this Act was passed, showed 176 million acres under organized protection, and 22 million acres or 12.6 percent of the protected area burned. In 1953, 374

million acres were under organized protection, and 2½ million acres or 0.7 percent of the protected area burned over.

Of course, there have been ups and downs in the record. The terrible drought and great losses from fire, particularly in the South, in 1930 was very discouraging. With the advent of the Civilian Conservation Corps, however, new life was given to forestry, including protection. Roads were built and fire towers erected, and many other needed protection improvements materialized in a relatively short time. These improvements are still of great value. However, probably one of the contributions of the CCC was the great impetus given to forestry in general. Forestry came through the depression of the 1930's greatly strengthened.

No history of fire prevention would be complete without mention of "Smokey Bear," the symbol of the valuable contribution made by The Advertising Council and its supporting business and advertising organizations. This campaign began in 1942 and is growing stronger every year. The state foresters are full partners in directing the program and are responsible for on-the-ground operations. It is estimated that the advertising value of the Smokey Bear campaign is now worth at least $8 million annually.

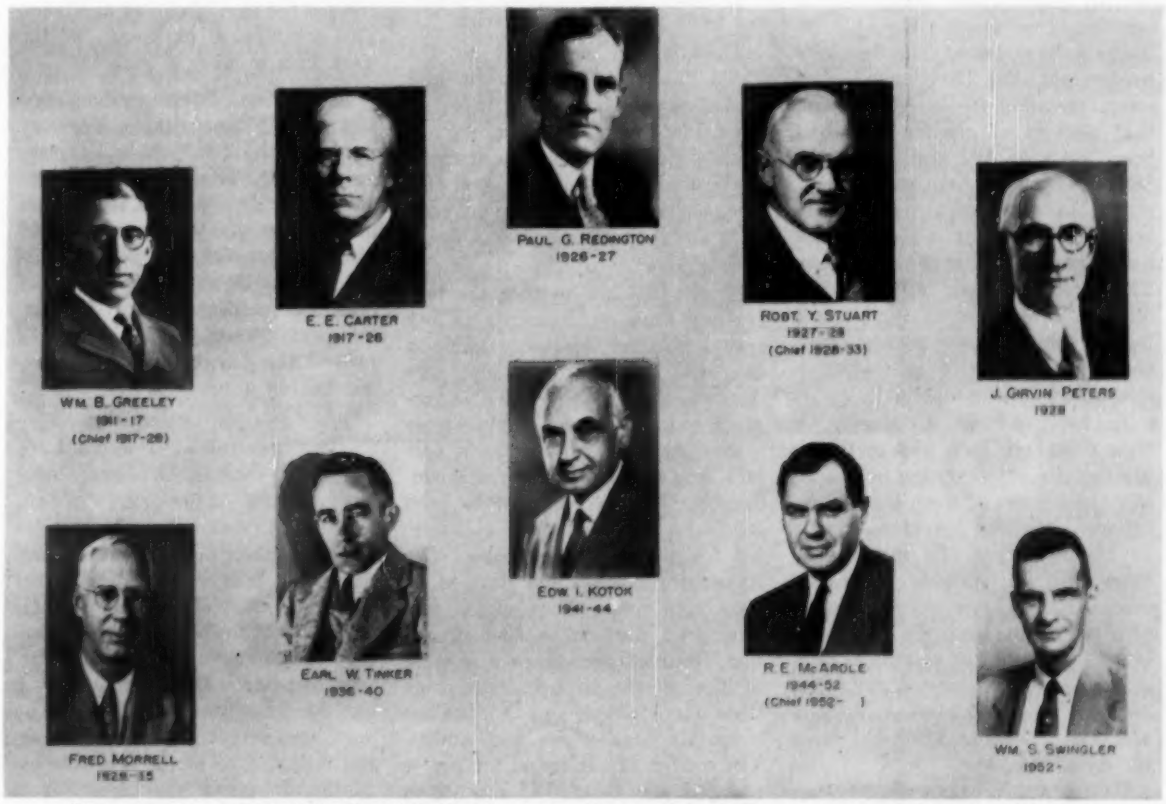
World War II witnessed a general step-up of fire prevention activities by agencies connected with the war effort. In wartime, smoke becomes a serious matter when it disrupts observation, communication, and transportation.

As war emergency funds diminished after the hostilities, foresters were faced with shrinking appropriations and increased costs. A study, made by the Forest Service and the cooperating states in 1950, showed that it cost $48,200,000 to protect 427 million acres of nonfederal forest and watershed land.

Fifty years ago it was difficult to persuade the general public and landowners that our woodland was worth protecting. Today the values at stake are so generally recognized that the states and private owners are expending about $29 million annually.

We still have 53 million acres unprotected by any organized force. And within the 374 million acres with organized protection approximately 135 million acres need more intensive protection because men, equipment, and money are spread too thinly. Eventually, to the protected area will be added the 53 million acres not now protected, and the organizations will be strengthened where more protection is needed with new types of fire control equipment and improved techniques for doing the job. How soon these improvements will be achieved depends upon the leadership of foresters and the will of the public and landowners to protect what they own.[1]

[1]Fire prevention and control are only one part of the forest protection effort. Protection from insects and disease is fully discussed in another article of this issue.



THE ASSISTANT CHIEFS of the Forest Service in charge of state and private forestry cooperation since the start of the program in 1911.

Photo by U. S. Forest Service

WASTEFUL HARVESTING in a northern forest. Several federal-state programs for assistance to private owners are designed to prevent this kind of poor cutting.

Planting

Attempts to help private landowners plant trees preceded the creation of the present Forest Service by several years. The Service's predecessor, the Division of Forestry, recorded in its 1891 report that packets of conifer seed had been given to 400 applicants. In 1899 it offered to help private citizens plan reforestation work, and later reported that a considerable number of such plans were made. There were no public nurseries producing planting stock for private land. Prospective tree planters generally had difficulty in finding a source of planting material.

In 1907, Edwin A. Merritt, a New York legislator, took an active interest in reforestation when he saw the success of some state plantations. Wishing to reforest some of his own land, he found that there was no suitable source of trees. In 1908 he secured a passage of a law authorizing the state nursery to sell stock at cost to private citizens. Seven sales aggregating 250,000 trees were made that year, and 179 sales for 1,005,000 trees the following year.

Pennsylvania began distributing trees for private planting from the state nurseries in 1910. Soon other states began such work, and by 1923 nineteen states were supplying trees from their nurseries.

Thus it was pioneering by the states that set the pattern and proved the practicality of reforesting private land with trees sold at nominal prices from state nurseries. It resulted in 1924 in a federal program to help the states do such work under Section 4 of the Clarke-McNary Law.

Under this law neither the federal nor state governments do any actual planting of the trees upon the land, nor do they offer any financial aid for doing so. The program is limited to supplying trees at nominal prices, or without cost in a few states under certain conditions. These trees must be used for forest and shelterbelt planting, not for ornamental purposes. The trees are produced and shipped by state employees. The federal government's part is to furnish advice, technical assistance, and some of the money to help encourage state participation and to make appropriate inspections and audits. The source of the trees, the prices charged for them, the conditions under which they are available, and other such matters are controlled by each state.

In 1926, the first full year of the cooperative program, 28 states participated and distributed a total of 22 million trees. In 1954, 43 states and Hawaii and Puerto Rico cooperated in the program and distributed almost 500 million trees.

One big drawback in the original Clarke-McNary Law, and in the Norris-Doxey Act of 1937 which provided additional authorization for such work, was the restriction that federal funds be used only for trees distributed to farmers. However, most of the states recognized that the need of the nonfarm landowner was exactly the same as that of the farmer and so went ahead without federal help on an additional program of distributing trees to all landowners who would use them for the stipulated purpose. In 1949, Congress amended the Clarke-McNary Law to remove the "farmer only" limitation, provided for an authorization of $2,500,000, and at the same time slightly increased the sum of money available. This encouraged expansion of the work in a number of states.

The Civilian Conservation Corps and the Prairie States Forestry Project (the Shelterbelt Project) greatly stimulated interest in tree planting. Two billion trees were planted by the CCC on 1,862,000 acres during the ten years of its life from 1933 to 1942. This effort completed a large part of the public land planting and definitely proved the feasibility of reforesting barren acres.

The Prairie States Forestry Project was initiated in 1934 (a time of serious drought, dust storms, and depression) to aid farmers in establishing shelterbelts to protect their fields from the damaging effects of winds. It continued until the start of World War II. About 18,510 miles of field shelterbelts, not counting the small plantings to protect farm homes, yards, and gardens, were established. The work was successful in demonstrating that shelter strips could be established over a wide area. It is responsible for the deep interest in

planting trees in the Prairie States at this time.

Mostly through state foresters, the Forest Service cooperates with the Agricultural Conservation Program Service which pays a part of the landowner's cost for planting trees and for timber stand improvement work as soil conservation or forestry measures. The Forest Service acts as technical advisor of this program, helps set general policies, and reviews the handbooks each state issues annually for this work.

Various estimates have been made from time to time as to the amount of land in need of planting in the United States. Currently, 60 million acres is the generally accepted figure. The most planting is now done in the South, where the annual rate approximates about one-half million acres. Most of this planting is done with trees furnished under the Cooperative Tree Distribution Program and financed in part by the Agricultural Conservation Program Service.

Although this is the most favorable planting rate of any section of the nation, it would still take more than 40 years to plant the poorly stocked acreage in the South. In the western and northeastern parts of the United States the current planting rates are so small in relation to total needs that more than 100 years will be required to do the job. Although tree planting has increased considerably under these various programs, we are still a long way from meeting the problem.

Assistance in Forest Management

Most of the work done by such early technicians of the Forest Service as R. C. Hall, J. Girven Peters, and Austin Cary was in the planning for management of large woodland properties such as those of the Great Northern Paper Company and the Tennessee Coal, Iron and Railroad Company. Although some states and the Extension Service worked with the small woodland owners, very little on-the-ground forestry assistance was available to them nationally until May 18, 1937, when the Cooperative Farm Forestry Act, commonly called the Norris-Doxey Act, became effective. It authorized advice to farmers regarding the establishment, protection, and management of farm forests. The Act specified farmers and farm forests and made no restriction as to the need for the states to match actual federal allotments. Much of the early work under the Norris-Doxey Act was experimental. Records were kept on individual farms and emphasis was placed on marketing problems. During World War II the work was expanded when the Shelterbelt Project was curtailed and the remaining funds transferred to Norris-Doxey activities. The money was utilized in establishing 100 additional projects to increase the output of forest products needed for war. An attempt was made to distinguish between projects of "farm forestry" and "forest farming" and the former was assigned to the Soil Conservation Service and the latter to the Forest Service.

On June 20, 1945, the Secretary of Agriculture directed that ". . . all functions of the Soil Conservation Service relating to the Cooperative Farm Forestry Program . . . are transferred to the Forest Service . . ." This meant that all types of projects were combined under the heading of Norris-Doxey Farm Woodland Management Projects. On April 1, 1946, 155 such projects were in operation in 39 states.

After the war ended, several changes were made in the scope and character of the Norris-Doxey projects and in the procedure for their administration. Where heretofore project foresters had been dual federal-state employees paid out of two funds they are now state employees paid by state funds. Federal funds are used to reimburse the states for a portion of the expenditures under a procedure similar to that used for cooperation with the states in forest fire protection.

Experience in working with small woodland owners developed a clearer recognition of the relationship of this service type of individual, on-the-ground assistance and the long-established educational group demonstration activities of extension foresters. The work in these types of complementary activities was correlated in 1948 when the Association of State Foresters and the Association of Land Grant Colleges adopted identical policy statements.

During the development period of the cooperative management program, special emergency programs were initiated to meet two major situations; the salvage of blowdown timber in New England following the hurricane of 1938, and the production of timber to meet the needs of World War II. In both these programs the Branch of State and Private Forestry of the Forest Service supervised the work with the full cooperation of the state agencies. Federal employees were assigned on a temporary basis to projects within the states chiefly because at that time most of the states were not adequately staffed with foresters.

In 1949, state and extension foresters joined forces to emphasize the need for adequate legislation required for service and education. Their partially successful efforts resulted in amendments to the Clarke-McNary sections dealing with tree planting and extension forestry. In 1950, the Cooperative Forest Management Act (Public Law 729) was enacted. It repealed the Norris-Doxey Act and authorized an appropriation of $2,500,000 annually. Assistance to processors and nonfarmers is provided for in this new law. The new Act calls for a national advisory board of not less than five state foresters, who meet with the Forest Service to determine policy and plans.

Under the new Act, Congress provided an increase in appropriation of $180,000 (total $632,429) which has stimulated states activity. In 1949 there were 179 cooperative forest management service foresters and the states spent $573,882 for this work. In 1954 there were 274 service foresters and the states spent $1,227,964.

Although the emphasis has shifted to assisting small landowners whose holdings constitute the

hard core of the problem of getting better forest management widespread through the United States, the Forest Service continues to work with the large landowners. Since 1905 a few specialists have been employed to assist with the more highly technical problems of big management. These specialists are now assigned to regional offices where they work in cooperation with the state foresters, serve as consultants to private and consulting foresters, and assist states and counties on special problems dealing with inventory, mensuration, growth analyses, and management plans.

Flood Prevention

More than fifty years ago, the Congress recognized the important relationship between forests and water when the basic Act of June 4, 1897 provided that, "no public forest reservation shall be established except to improve and protect the forests within that reservation, or *for the purpose of securing favorable conditions of waterflow*, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States."

Subsequent legislation, including the Weeks Law of 1911 and the Clarke-McNary Act of 1924, continued to recognize this important relationship. One of the purposes of the Weeks Law was to enable the Secretary of Agriculture to cooperate with any state or group of states "in the protection from fire of the forest watersheds of navigable streams. Under the Clarke-McNary Act, one of the basic requirements was that due consideration be given to the protection of watersheds of navigable streams in extending cooperation to the several states.

The Omnibus Flood Control Act of 1936 provided that the federal government, in cooperation with the states and their political subdivisions, should undertake investigations and improvements of waterways, including the watersheds thereof, for flood control purposes. The Secretary of Agriculture was specifically authorized to investigate watersheds and measures for waterflow retardation and soil erosion prevention. Under the authority of this Act, 71 percent of the land area in the United States was covered by preliminary examinations and surveys, totaling 153 watershed reports.

Eleven of these watersheds were authorized by Congress in 1944 for works of improvement, which included among other things intensified fire protection of forest lands, tree planting on eroding flood source slopes, stabilizing forest road and trail side-slopes, and technical assistance to private forest owners and operators. States, counties, and private landowners within these 11 watersheds have been assisted in the rehabilitation and improvement of forest lands primarily for the purpose of reducing the yield of flood water and sediment from these lands.

More recently, some 60 small watersheds were selected upon the recommendation of the local people for treatment as watershed protection demonstration projects under the provisions of the Agricultural Appropriation Act of 1954. Here, again, the Forest Service is assisting state forestry agencies, soil conservation districts, and the private forest owners to reforest critically eroding open land too steep for agriculture; to stabilize logging and woods roads which are contributing to excessive runoff and erosion; and to prepare plans for conservative management of these privately owned forests and woodlands. Some 1,200 acres have been planted and an additional 2,800 acres protected from fire and grazing in the past two years on these small pilot watersheds.

In 1954 Congress made possible the expansion of this concept of cooperative local-state-federal action to protect and improve the soil and water resources of the nation's small upstream watersheds. Public Law 566 authorizes the coordinated extension of soil and water conservation assistance, with the initiative controlled by the local people, and with appropriate individual-local-state-federal cost sharing.

This law, known as the Watershed Protection and Flood Prevention Act, established a much needed pattern of cooperative watershed treatment. It will assist in the protection of the highly important forested watershed lands which occupy one-third of the nation's total land area. It will be of great help on the 57 percent of our country's forest land now owned by farmers and also on state-owned forest lands. Not only will this Act provide for the improvement of our soil, forest, and water resources, but it will also strengthen the bonds of local-state-federal partnership in the resource conservation effort, permitting each to play its proper role.

Conclusion

During these first fifty years of forestry on state and privately owned lands many successes have been achieved. Some 374 million acres have been brought under fire protection. Twenty-three million acres have been put under management as state or community forests. Many large privately owned tracts have been brought under good management to insure a continuous supply for multi-million dollar pulp, paper, lumber, and veneer mills.

Nearly 2,000 foresters are now doing technical forestry work for the states and another 6,000 are in private forestry, either employed by industry or working as consultants for a fee.

Approximately 7½ million acres of state and privately owned lands have been reforested.

About 250,000 small woodland owners have sought and received technical advice on the management of their woodland.

The state foresters have formed a strong association and have worked together on many important projects.

A beginning has been made in flood prevention through management of forests on privately owned watersheds.

What of the next half-century? Impressive as the above list of successes may be, any forester could easily compile an even longer list of things to do.

Fifty-three million acres remain outside organized fire protection,

and existing fire control organizations in many places must be strengthened. Much land now owned by states and communities remains to be developed and given more intensive management. Some 60 million acres of land need replanting.

Flood prevention through forestry is still in its infancy in many places and is urgently needed. Approximately 2 million small woodland owners and 50,000 small processors need technical assistance in the management, harvesting, and processing of the products of their lands.

To achieve a substantial part of this goal will be a formidable task. Yet foresters do not doubt that it and much more besides will be achieved during the next fifty years. One of the things that makes this possible is the experience of a time-tested policy of the cooperative state-federal approach to the handling of private forestry problems. This state-federal partnership, as exemplified by the Clarke-McNary Law, was probably the outstanding development of the past quarter-century and will continue prominent in future programs. All in all, if events of the past foretell those of the future, there is ample reason to expect great developments in forest management on state and private lands during the next fifty years.

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Small Woodlands and the Public Services: A Retrospect

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ABOUT 1926 I was detailed to handle a request from a woodland owner in Dutchess County, south of Albany, asking to have a forester examine his woodlot, near Rhinebeck. Normally, in those days, we would refer such requests to the Extension Service, but sometimes, when the woodlot was not too far from Albany, we would send somebody out (pursuant to sub-division 14 of Section 50 of the Conservation Law, which provided that we might "examine private forest lands for the purpose of advising the owners as to the proper methods of forest management"). The importance attached to this kind of service in 1926 may be readily appreciated from the fact that it was a cub forester who got the detail. Moreover, I was told in advance that there wasn't much I could do for this gentleman, except give him general advice; no timber estimating would be done, which proved to be, of course, just what the owner did want. He doubtless thought we did not give him much help, and he was right.

How could I know that, 28 years later, this same owner, William Wollerton by name, would be a cooperator under the Forest Practice Act, a member of our District 14 Forest Practice Board, and the proprietor of a custom wood-chipping service which is among the best known in the state? Nor could I have visualized in 1926 the 30-man technical staff that would be engaged here, in 1955, marking and estimating timber, making management plans, and furnishing marketing assistance to between 4,000 and 5,000 private woodland owners in New York.

Private forest management came to New York as a state function in 1946, with the enactment of the Forest Practice Act; but for six years before that an active program of farm forestry had been in operation, as a result of the federal Norris-Doxey statute. It may be going too far to say that the programs in New York and other states were direct outgrowths of the Norris-Doxey Cooperative Farm For-

Photo by U. S. Forest Service

A PROJECT FORESTER and woods operator inspect the harvesting of white ash for handle stock on a farm woodlot in New York State.

estry Act of 1937, but they certainly received a powerful stimulus from it, just as the state fire-control programs of an earlier period were immeasurably strengthened by the infusion of federal funds and Forest Service thinking as a result of the Clarke-McNary Act. Whether we like the idea or not, of having the federal government participate in our state affairs, we might as well be honest and ask ourselves where we (i.e., the states) would be today without the leadership which the Forest Service and other agencies of the Department of Agriculture have provided in fire control, disease and insect control, management assistance, and research.

Federal-State Cooperation

New York is an interesting state through which to follow the course of federal cooperation, because it has been, from time immemorial, a strong believer in state rights. In our early relationship with the Forest Service there may have been a degree of resentment over federal encroachment into state forestry, even though mitigated by the financial grants-in-aid provided under "CM-2" and "CM-4." There may at times have been some doubt as to whether the funds received were worth the extra bookkeeping entailed. Of one thing everybody was certain—that there never were and never would be, any national forests in New York! Yet, with the years, has come acceptance, and today we regard the Forest Service as a working partner, and look forward to the arrival of its "visiting firemen" (using that term in its general, as well as its special connotation) on their appointed rounds.

But to return to the woodland owner and his problems. Much of the profession, I believe, and certainly most of the public, is inclined to think of forestry by the federal government prior to the 1930's in terms of the national forests and cooperative fire control. It is well to recall, however, that for seven years prior to the establishment of the Forest Service in 1905, the old Forestry Division under Gifford Pinchot's leadership was engaged in a program of trying to introduce forest management into the privately owned woodlands of the country.

Some of the quotations from Pinchot's memoirs, *Breaking New Ground*, make revealing reading for those under the impression that public assistance to private woodland owners is a product of the mid-century, the New Deal, or even of the Clarke-McNary and Smith-Lever Acts. Pinchot became chief of the Division on July 1, 1898, and one of his first acts was to "let it be known that the Division was prepared to help private owners harvest their timber with a view to a second crop."

This offer, made first by word of mouth and later through Circular 21, included "whatever was needed to get Forestry going—working plans for conservative lumbering, with full directions for practical work, and assistance on the ground. Help was free to the owners of woodlots. Owners of larger tracts paid the expenses of our men in the field, but not their salaries, and the cost of local assistants."

"We cast our bread upon the water," says G. P., "and the demand for help to practice Forestry came back at us with a rush. Within four months . . . applications had been made for help in handling nearly a million acres in nineteen states." By the end of the year successful forest management was in actual operation on 108,000 acres, by June 30, 1899, 123 lumbermen, farmers, and others had asked for help in starting forestry on a million and a half acres of timber land in 35 states. No one without the fanatical courage of a Pinchot would have let himself in for this sort of thing, with only a corporal's guard of young foresters for a staff, even though those youths bore names that were to become household words in the profession: Graves, Toumey, Griffith, Hosmer, Sherrard, Gaskill, Ashe, and Price.

But even the indefatigable Pinchot became appalled as the flood of requests mounted: "We had turned on the water," he stated, "and were like to be drowned." All of which should give heart to today's project foresters on CFM who wonder whether they'll ever catch up with that backlog of requests.

Education and Assistance

The transfer of what were to become the national forests to the newly named Forest Service in 1905 automatically diverted the energy of the federal forestry organization from concern for the private owner (mostly in the East) to responsibility for administering the huge tracts of government owned lands in the West. After 1905 we hear relatively little from Washington about the private owner (so far as really doing anything for him) until 1924.

That year, a fateful decision was made when Section 5 of the Clarke-McNary Act was passed, to provide for making specific federal funds available to the land grant colleges for the employment of extension specialists in forestry. Whether this decision was the best one in the long run, who shall say? The state foresters were not pleased with it at the time, and it was responsible in large measure for the controversies which arose, in the early days of the Norris-Doxey Act, as to which agency should control the program at the state level. But on one point all must agree; Section 5 kept farm forestry from becoming involved in local political situations, and placed it where it logically seemed to belong at the time, with the educational institutions.

Nothing, except research, is more difficult to evaluate in its tangible results than education, and it would be a braver individual than the present writer who would try to estimate how much or how little has been accomplished by forestry through the Extension Service during the past thirty years. The limitations, however, of the educational approach in getting forestry into the woods, limitations which made action programs such as that under the Norris-Doxey law inevitable, were never outlined more succinctly or with greater objectivity than by the late J. A. Cope in his *Farm*

Forestry in the Eastern United States, published by the Charles Lathrop Pack Foundation in 1943.

One of the more distinguished, and certainly one of the most aggressive extension foresters in the country, Cope was completely loyal to the Extension Service, with which he had been so long identified. Yet, toward the close of his active career, and after having put his "fighting heart" into the struggle for better woodlot management over a period of two decades, he was obliged to admit that, while this educational approach had laid a "foundation on which woodland owners might build to a greater appreciation of farm forestry and its possibilities," nevertheless, "of actual accomplishment in planned cutting in the woods by virtue of the extension forester's program, the record is meager, . . . there are some cooperators in every state who are handling their woodlots intelligently and well . . . but these are oases in a desert of indifference and neglect."

He goes on to analyze the inherent weaknesses of the program: inadequate means for follow-up; dependence on the county agent, who may or may not be forestry minded; and difficulty of really educating large groups. At the time this bulletin was written the Norris-Doxey program was already a going concern, and the fact that he had seen this program in action and had participated in directing its course in New York undoubtedly made Cope more fully aware of the inadequacy of education *per se.* Of the Norris-Doxey law, he remarked, "In that direction lies the future of farm forestry, because it combines within a limited area the educational and service approach." This ideal is being realized today in many states through close collaboration between the service organization of the state forester and the educational program of the Extension Service.

A Period of Adjustment

Any discussion of the Norris-Doxey Cooperative Farm Forestry Act and its successor, the Cooperative Forest Management Act of 1950, is not likely to be very illuminating unless brought into focus with the various state programs having to do with private forestry —some regulatory, some with service features only—but all set up since 1940 and all influenced by the impact of the federal programs upon the different state governments. The Norris-Doxey law was enacted in 1937, but because of delay in appropriation of funds did not get under way until 1938 and 1939.

Photo by U. S. Forest Service

PROPERLY MANAGED, farm woodlots yield regular income. The farm forestry program is designed to help farmers with problems of management and harvesting.

In the meantime, some confusion had been engendered by Secretary Wallace's famous Memorandum No. 785 of October 6, 1938, turning over the administration of the program to the Soil Conservation Service. A subsequent memorandum, early in 1939, reversed this action, in part, by giving back to the Forest Service, jurisdiction over "forest farming" projects.

After having been partitioned once, between the Soil Conservation Service and the Forest Service, the Forest Service part of the program was further dismembered by virtue of an either/or arrangement under which the direction of the program in a given state might devolve upon the state forester or the Extension Service, depending, to put the matter baldly, on who "got there fustest with the mostest funds."

Despite the confusion and competition for control at the higher administrative levels, once the program got down to the project level, it began to get things done. The need for direct management and marketing assistance for the small woodland owners was so obvious, and the services were accepted so eagerly by the woodland owning public, that the only question raised was why it hadn't been done before.

It would be a mistake to say that the state forestry departments had not been doing anything all this time; actually, they had carried on work with private owners, depending on the extent to which they delegated this job to the Extension Service. And in those northeastern states which after 1922 had a well-developed program of white pine blister-rust control, in cooperation with the Bureau of Plant Industry, and later the Bureau of Entomology and Plant Quarantine, pine woodlot owners were exposed to education in forest management, reforestation, and general forestry from the blister-rust field men, right along with their indoctrination on Ribes eradication.

This is a phase of the blister-rust control program (now an integral part of the Forest Service) which never got the public recognition it deserved. The blister-rust agents were the forerunners of the farm foresters, and it is gratifying to find that a number of them later became associated with farm forestry, either on temporary assign-

ments during the war years, or on permanent appointments on Norris-Doxey work, or else with the Extension Service.

Policies Clarified

Prior to 1940, assistance to private woodland owners by the states had been mostly of a casual nature or, as in extension work, purely educational. What the Norris-Doxey law did was to provide a long-term program with definite objectives and standard procedures. Even when the states started programs of their own, their policies and techniques were fundamentally affected by their experience with the federal program.

In New York, for instance, five Norris-Doxey projects were set up between 1940 and 1943. In 1945, the State Conservation Department, having secured a sufficient allocation of state funds, assumed the administration of the projects; and in 1948, when our program went over to a reimbursement basis, the farm foresters were transferred to state civil service status and their activities merged with the program for which state legislation had been enacted two years earlier. Similar patterns developed, no doubt, in other states.

Since the change-over to a reimbursement policy in 1948, and the enactment of this policy into statute by the Cooperative Forest Management Act, the states have been more on their own. Visits from Forest Service personnel are less frequent, the Service feels less responsibility for training and inspection, and the states have been able, if they so chose, to deviate considerably from original Norris-Doxey procedures. The value of the reimbursement funds varies from one state to another, depending on state finance laws and the extent to which the particular state is financially able to carry on its own program.

In New York, where these funds go into the state treasury they are not effective from an operational standpoint, but are definitely valuable in strengthening the position of the program when it comes up for review before budgetary officers. A professional benefit is obtained from the cooperative type of program whereby our contacts with Forest Service personnel, and with other state leaders at regional meetings are extremely worthwhile.

Indirect Results

I have attempted to trace the *positive* effects of the various federal programs on the state activities. There are also certain ways in which federal policies were effective in the setting up of state programs or enactment of forest practice legislation in a sort of backhanded way. That is to say, the advocacy by the Forest Service, during the 1930's and 1940's, of the philosophy of regulation, and its active endorsement of proposed regulatory statutes, undoubtedly spurred consideration by the states of legislation designed to offset federal regulation. Thus, the idea of forest practice acts in a number of states, including New York, was nurtured in the Council of State Governments, where a model act was drawn up, and transmitted to state legislative committees.

As was previously mentioned, one of the agencies given responsibility for administration of the Norris-Doxey law in 1938 and 1939 was the Soil Conservation Service; and for nearly a decade S.C.S. farm forestry projects operated right along side the "forest farming" projects of the Forest Service and state agencies. In the S.C.S. projects emphasis was placed on reforestation as a soil and water conservation measure and, since S.C.S. could raise only a portion of the needed planting stock in its own nurseries, arrangements were entered into with some states for propagating stock on a cooperative basis. This, together with CM-4, PMA payments, and mounting interest in tree planting generally, was a factor in the postwar "reforestation boom." In recent years, S.C.S. has tended to refer the forestry phases of its projects increasingly to the state forestry departments, thus leaving its own technicians more time for promoting the techniques in soil conservation more closely related to agricultural practices, though maintaining a strong interest in forestry.

Of the research projects carried on by the Forest Service in farm forestry, few were more intensive than the one at Cooperstown, N. Y., out of which developed the Otsego Forest Products Cooperative, Inc. Both the research project and the cooperative have added materially to the intensiveness of woodland management practices in that locality.

A Look Ahead

Altogether, the small woodland owner (a designation which is fast replacing the old term "farm woodlot owner") has been getting a lot of attention from all hands in the past 20 or 30 years, though the "actual accomplishment of planned cutting in the woods" and the supply of technicians available to provide service are still pitifully small in comparison to the aggregate of such lands. But the period of trial and error seems to be over.

The principles and techniques of service work with small woodland owners are well understood, and the reimbursement pattern of federal aid to the states is fully established. If the Forest Service and the states continue to take these responsibilities seriously, and cooperate as they have done the past five or six years, the future of the small woodland is going to be a lot brighter than its past.

The Role of the Forest Service in Control of Insects and Diseases

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NATIVE and introduced forest insects and diseases are causing greater timber losses than are caused by all other agencies combined. It is estimated that they destroy more than 6 billion board feet of timber annually. In addition to these losses in timber are the less tangible, but equally serious, effects of insect and disease epidemics on scenic forested areas, on watershed values, wildlife habitats, and on the future growth and quality of timber.

Apart from the enemies of living trees in the forests, there also are diseases and insects which cause great loss to forest products in storage, in transit, and in use. Indeed, such losses as those caused by stains, decays, termites, powderpost beetles and borers in lumber, pulpwood, and in other forest products also total several billion board feet annually.

When insect and disease outbreaks reach epidemic proportions, they do great damage over extensive areas and their effect is often catastrophic. Bark beetles such as the Engelmann spruce beetle, Douglas-fir beetle, western pine beetle, and southern pine beetle, and defoliators such as the spruce budworm, tent caterpillars, and sawflies are examples of those that have at times assumed epidemic proportions and caused tremendous losses.

Moreover, chestnut blight wiped out an entire species and blister rust threatens our valuable white pines with destruction. Needle blight of ponderosa pine has periodically become epidemic over vast areas and oak wilt is a threat to our most abundant hardwood species.

Equally damaging, although not so obvious, are less conspicuous pests which are always present in the forests. Such pests as heart rots, dwarfmistletoes, tip moths, and weevils are among those that destroy values equal to or exceeding those occurring during the more spectacular epidemics.

Photo by Weyerhaeuser Timber Co.

ENTOMOLOGISTS examining a windthrown tree in Coos County, Oregon, to determine the amount of infestation by the Douglas-fir beetle. Sample plots are cruised annually to record the effects of the beetle on this industrial forest.

Insect and disease losses therefore are causing concern to all owners of forest lands. The Forest Service has a major responsibility in holding these losses to a minimum, not only on national forests but also on all other forest lands, irrespective of ownership. To this end it conducts (1) research designed to develop more effective and economical prevention and control measures; (2) surveys to detect and appraise insect and disease outbreaks; (3) control projects to check both endemic and epidemic losses to our timber resources.

Cooperation between state, private, and federal agencies is emphasized throughout all phases of this program. In research the Service also cooperates with the Division of Forest Biology of the Canada Department of Agriculture on problems common to both countries.

The Forest Service maintains units of professional forest entomologists and pathologists in each of its experiment stations and in some of its research centers. Research and survey projects on a given insect or disease are closely coordinated to obtain maximum effectiveness and to prevent duplication of effort. Entomologists and pathologists in the Forest Service also conduct research and surveys cooperatively with states and with private timber-owning agencies when problems are of mutual interest. Improved control practices are made available to the public as rapidly as they are developed through research.

Developments in Research

The Department of Agriculture has been conducting research on forest insects and diseases for approximately fifty years. With the reorganization of the Department in November 1953, these functions were assigned to the Forest Service.

The earliest work in these fields consisted in identifying harmful forest insects and in diagnosing tree diseases. Soon thereafter, these studies were extended to provide information on the life histories of the forest tree pests, the host relationships, and factors predisposing trees to attacks. This work has been followed by the present broadened program which also provides for studies designed to develop the most practicable methods of preventing or controlling insects and diseases, thereby producing the maximum yield of high grade timber in our forests.

Research in forest entomology during the early years developed methods for the provisional control of a limited number of insects. For example, felling, and peeling or burning was used against some bark beetles. Insecticides, applied by large hydraulic sprayers, were used against some defoliators. Greater efforts were also put into biological studies.

In recent years research has provided remarkable improvements in the direct control of certain insects. These were outgrowths of the synthesis of DDT during World War II and its successful application by airplanes for the control of the spruce budworm, gypsy moth, Douglas-fir tussock moth, and certain other defoliators. Since World War II, through the use of new insecticides, important progress has also been made in the control of such destructive insects as ambrosia beetles, powder-post beetles, termites and many species of bark beetles, particularly through use of such chemicals as benzene hexachloride, chlordane, methoxychlor, and ethylene dibromide.

Photo by U. S. Forest Service.

FIRST aerial strip viewer ever devised for observing and recording beetle-killed trees.

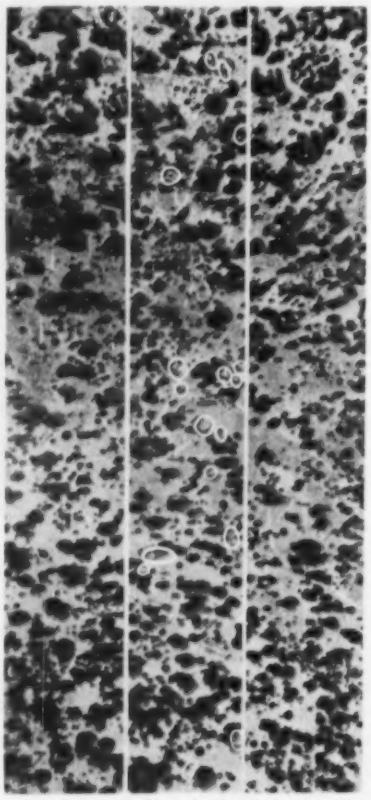

Photo by U. S. Forest Service.

OBSERVER counts bark beetle-killed ponderosa pine trees in eastern Oregon inside the 330-foot wide strip of ground (on photograph) through aerial strip viewer. This new aerial survey method now in the experimental process of development may soon replace many arduous ground surveys.

Important progress has also been made in the indirect control of insects. For example, it has recently been demonstrated that damage by the western pine beetle in interior ponderosa pine stands can be greatly reduced by selective removal of beetle-susceptible trees from the stand.

The present trend in insect research is toward the further development of methods for preventing damage. Greater emphasis is also being placed on studies of outbreak causes, on the role of natural factors in their control, and in the development of management practices leading to prevention of outbreaks.

Direct control measures have been found for some forest diseases. Among these are chemical controls for many diseases in forest tree nurseries, the suppression of oak wilt and of dwarfmistletoes through sanitation measures, blister rust control through ribes removal, and the control of brown spot of planted longleaf pine through the use of prescribed burning.

Most diseases, however, are best combatted by indirect measures. Protecting trees from fire and from logging injury avoids butt rot. Proper stand thinning procedures prevent most of the cull in sprout oak from stump rot. Harvesting mature trees at the right age avoids excessive decay losses. Growing shortleaf pines only on sites not favorable for the littleleaf disease prevents a perpetuation of excessive losses from this disease.

Research on fungi that attack forest products has been directed

principally toward prevention of damage through improved storage and seasoning practices, better structural design, protection against excessive moisture, and chemical treatment.

Present forest disease research includes studies of fungi, bacteria, viruses, dwarfmistletoes and the diseases they cause; also such environmental factors as smelter fumes and extremes of heat, cold, and moisture. The present trend is to avoid still other losses through the selection and breeding of disease resistant trees.

Survey Services

Surveys for forest insects and diseases were begun early in the twentieth century. While conducting research on these pests some investigators made attempts to determine the overall range of certain ones and to estimate the damage they caused to forest stands. Early survey methods were largely empirical and for some pests these methods are still in use. For other pests, special studies have been made of the most effective and economical methods to use.

Certain types of surveys, such as those made for the detection of insect infestations and for some diseases causing pronounced symptoms, are simple to execute and can be made by observers with a minimum of training and experience. Others that are made to determine the range of insects and diseases that produce more obscure symptoms, to appraise the extent of damage and determine potentialities for future build-up, or to determine the feasibility of control, are much more complex and must be conducted by trained forest entomologists or forest pathologists.

Since the passage of the Forest Pest Control Act of 1947, there has been a notable increase in the degree of coverage of the forests of the country by insect and disease surveys. The Forest Service determines the insect and disease conditions on national forests and cooperates with other federal agencies, states, and private timber owners in surveying lands under their jurisdiction. An effort is being made, and it is meeting with growing success, to detect all potentially destructive pests in their early stages, so that suppressive measures may be promptly undertaken if needed.

In pursuit of this objective, the Forest Service serves as a clearing house for insect and disease detection reports. As these are received from reporting agencies or individuals they are classified and evaluated. If the situation appears alarming, trained forest entomologists or pathologists go to the affected areas to appraise the situation and notify the person or agency by whom the report was turned in. If the owner of land on which insects or diseases are prevalent wishes to undertake corrective measures, he is given advice on which to base a control program.

Surveys for forest damage by insects and diseases are conducted both from the air and on the ground. Survey from the air is feasible when insects defoliate trees; or when they cause rapid changes in foliage color as they attack other parts of the tree. When tree diseases cause characteristic symptoms to develop in the crown of trees, as in the case of oak wilt or pole blight of western white pine, aerial surveys are also practicable.

However, the prevalence of other insects, with different feeding habits, whose effects on trees are less readily discernible, must be determined from the ground. Diseases, such as sweetgum blight, some root rotting diseases, dwarfmistletoe, and decay fungi, do not produce symptoms distinguishable from the air and must also be surveyed from the ground.

The Forest Service is investigating the maximum usefulness of aerial surveys and the minimum amount of coverage needed in ground surveys to give dependable results. As new information is obtained, it is at once placed at the disposal of agencies and individuals to whom it might be helpful.

Control Services

Before the beginning of this century, little work had been done in this country on the control of forest insects and diseases. The Commonwealth of Massachusetts had attempted, without success, to eradicate the gypsy moth which had been introduced some years earlier. The first attempt to control a bark beetle infestation was made in the Black Hills National Forest in 1906. Shortly thereafter work was also begun to combat the chestnut blight and the white pine blister rust. During the following years, due to increasing public interest in protection of our timber reserves, there has been a great increase in our efforts to control forest pests. Today the federal government is spending $6,000,000 annually for this purpose.

Generally speaking, the objective in forest pest control is to prevent or suppress losses from injurious insects and diseases and to prevent their spread. The Forest Service is responsible for this work on the national forests. It also cooperates with other federal agencies, with states and with private owners in controlling these pests on lands under their jurisdiction. Control methods used depend on the pest and its life history and habits.

The Forest Service devotes much effort to the suppression of outbreaks. More attention will be given to their prevention as more factual information becomes available on this vital subject. Work normally involves the control of bark beetles infesting conifers, and control of white pine blister rust, with some attention being devoted to the control of defoliator outbreaks on both conifers and hardwoods. In recent years, highly destructive outbreaks of the Engelmann spruce beetle, the Douglas-fir beetle, and the spruce budworm in the West have been combatted.

The employment of good forest management practices, such as through sanitation and salvage, reduces some of the most serious losses from both diseases and insects. However, epidemic outbreaks often require the application of more direct methods.

For example, the federal government for many years has been engaged in a program of control of the white pine blister rust through

Photo by U. S. Forest Service

APPLYING DDT INSECTICIDE to control an epidemic outbreak of the Douglas-fir tussock moth in northern Idaho.

eradication of the alternate host. Control is being maintained on selected white pine areas totalling over 16 million acres, or about three-fourths of the area at present deemed suitable for control. The Forest Service uses its blister rust funds to expedite control of this disease on national forests and on state and private lands in cooperation with the owners, under authority of the Lea Act of 1940.

Another example of direct control of an epidemic outbreak is that recently conducted against the southern pine beetle in northern Mississippi. The cutting and prompt utilization of infested merchantable trees, coupled with spraying of the trunks and large limbs of unmerchantable trees, brought the outbreak under control.

In compliance with the provisions of the Forest Pest Control Act of 1947 the Forest Service also assists, in certain cases, in the control of pest outbreaks on lands under the jurisdiction of other federal agencies, state, and private land owners. Pest-control projects on lands in public ownership are financed by the organization having jurisdiction over them. In instances where epidemics on private lands qualify under the Forest Pest Control Act they become the joint responsibility of private, state, and federal agencies and the cost is shared jointly.

In order to qualify for federal financial assistance in the control of insects and diseases on private lands, the pest must constitute a threat to timber resources; an effective method of control must be available; and the state and private owners must finance a major portion of the cost of control. Each project is considered individually on the basis of its merits and is given a priority rating on the basis of threat and the technical and financial resources available for undertaking it.

In addition to the financial assistance outlined above, the Forest Service also gives considerable technical guidance in the field of pest control to state and private foresters seeking this assistance. On request, its forest entomologists and pathologists investigate reports of abnormal insect and disease conditions and determine the hazards to forest stands. They supply advice and information on control methods recommended for use against each insect species or disease and conduct schools for local foresters and other personnel associated with pest control.

Assistance is also frequently given by Forest Service personnel in organizing, conducting and checking the results on control projects. The success attained on recent cooperative control projects strongly indicates the wisdom of expanding this line of endeavor on a country-wide basis.

The problems arising from forest insect and disease outbreaks are many and they are complex. A cooperative and coordinated program by the federal government, states, and private industry, including an expanded program of research, survey and control activities, would appear to offer the earliest and best solution to these problems.

Aid to Snowbound Hunters

Ask any of the 50 million people annually using the national forests what services they received from the forests, and you will get many different answers.

The 200 hunters who were trapped by a two-day snow storm in the Wyoming mountains a year ago undoubtedly would say that the food dropping by the Big Horn National Forest in cooperation with law enforcement officers was the greatest service ever performed by the Forest Service. The rescuing agencies made reconnaissance flights over spots where hunters were known to be camped and dropped food to those where the letter *F* had been tramped in the snow. Within a few days rescuers had bulldozed roads into areas serving the greatest number of hunters, and the sportsmen returned to civilization safely.

The Forest Service and the States

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CREDIT FOR THE beginning of forestry activity belongs to the states though it was carried on by the federal government as early as 1876. In 1777, North Carolina—and, ten years later, South Carolina—passed laws against carelessness with woods fires. Michigan and Wisconsin made studies of conditions and needs of the woods as early as 1876. By the latter half of the 19th century, most of the eastern and Lake States had taken legislative notice of their forest resources. The year 1885 is notable because New York created its first forest reserve and California established a State Board of Forestry. A number of other states set up somewhat similar state agencies in the years following. With all this interest in forestry in the states, it was a natural development that a comprehensive federal program should evolve.

Most of the states now have forestry agencies. My own Missouri was one of the latest to set up an organization. Although an earlier attempt had been made in the late 1920's, it was abandoned after a few years and not revived until our Conservation Commission set up a Division of Forestry in 1938. Forty-three state foresters represent commonwealths in the membership of the Association of State Foresters. These states are the ones which, by reason of climate and soil conditions, contain most of the timberland.

There is a considerable difference in the organization of forestry work by the states. Some have independent forestry boards or commissions; others are divisions of departments of conservation or natural resources; in a few cases the forestry work is under the direction of personnel responsible to the state university, land commissioners, or other boards. Despite these differences in organizations most have one point in common; the man in charge of the work is designated officially or unofficially as the state forester. The use of this title has been helpful in simplifying arrangements for cooperative action programs between the U. S. Forest Service and the states. In educational work in forestry, the state extension foresters, who are attached to the extension services of agricultural colleges, cooperate closely with both the federal and state forestry departments.

Although there are several phases of forestry work in which a definite pattern of state-federal cooperation has been established by law, there are other areas of cooperative effort that have come about mainly because the objectives of both federal and state services are to maintain and improve the forest resources. That is, both parties have identical ideals. There are many variations, though. In the development of state forests, for instance, there are wide differences.

Four states—Minnesota, Michigan, New York, and Pennsylvania, with 13 million acres of state forests—have about three-fourths of all the state forest acreage, though at least 33 states have areas listed as state forests. In a number of cases, the U. S. Forest Service has rendered helpful assistance in the transfer of federal areas, such as resettlement areas, to the states for use as official forests. In most cases, state timber tracts are managed along patterns set up for the national forests.

In the field of reseach, state forestry agencies have usually looked for help to their state colleges, state experiment stations, and to the forest experiment stations and Forest Products Laboratory of the U. S. Forest Service. Active forest research is being carried on with state departments furnishing services and funds to colleges, experiment stations, and to branches of the Forest Service for research in management, fire protection, insect and disease control, and other problems.

Over the past fifty years a major and somewhat unrecognized help to states has been the numerous bulletins of a research and informational nature prepared by the For-

SITE OF POE MILLS
ABOUT 1890 THIS LUMBERING CENTER HAD A POPULATION OF 600
IT VANISHED AS THE FORESTS WERE DEPLETED
NATURE WILL RENEW THIS WEALTH IF GIVEN A CHANCE
PREVENT FOREST FIRES-IT PAYS

Photo by U. S. Forest Service

A HISTORICAL MARKER records a story of the abandonment of a forest community on what is now a Pennsylvania State Forest.

est Service. These have been of outstanding value to state foresters in carrying on the administrative details of their work. The Forest Survey is another example of a service flowing from the larger to smaller unit. There is, of course, a need for supplemental information by the states themselves, but the initial handling of this work by the U. S. Forest Service probably was in the interest of economy and certainly had definite advantages in correlation of timber information from the individual states to provide national totals.

Cooperation between the U. S. Forest Service and the commonwealths in state and private forestry, as authorized under the Clarke-McNary Act and the Cooperative Forest Management Act, is a fine example of working relationships in the federal and state field. Participation began with the Weeks Law in 1911, followed by the Clarke-McNary Act in 1924 and the Norris-Doxey Act in 1937. These earlier enactments have been further improved by more recent legislation now in force; the amended Clarke-McNary Act of 1949 and the Cooperative Forest Management Act of 1950.

Fire Control

But in spite of our advances in research and techniques, the first requirement for successful management of forest land is control of wildfire, and in the cooperative programs we find that 43 states are receiving assistance from the Forest Service in the protection of state and private lands from the fire menace. Although the funds provided by the government are less than one-fourth of the amount expended by the states, this is a useful contribution. However, there has been no increase in federal funds appropriated over the past several years. Since new programs have been adopted in some states and there has been expansion in others, this has meant diminishing amounts for states which were doing the best jobs.

There are still some 53 million acres of forests without organized protection. The state foresters are anxious to get on with the job as soon as they can obtain adequate financial support. The 43 states doing cooperative forest fire control work maintain organized protection personnel, lookout towers, special mechanized fire equipment, and telephone and radio communication facilities. They use airplanes, both for detection of fires and the direction of fire fighting activities. The forest and watershed land under organized protection by the states amounts to approximately 375 million acres. This is an acreage about equal to twice the area of federal lands in all of the national forests. The state services work on as many as 94,000 fires each year.

The Forest Service has played a most helpful role in aiding states in starting fire control work. The Service people have been able to bring to the attention of state personnel information about new techniques and advancements made in other states and in the federal forests; they have encouraged the pooling of ideas and fire fighting equipment between groups of states for more efficient fire control; and their occasional visits to the state projects have stimulated a desire for greater efficiency.

An outstanding example of the effectiveness of state and federal and private cooperation is the nationwide campaign under the sponsorship of the Advertising Council. Smokey, that famed "fire-preventing bear," has for several years furnished a vehicle for radio, television, newspapers, magazines, and posters to carry a fire prevention message. American business has aided this program in a most commendable manner, and much of its success stems from the nationwide scope provided by the Forest Service.

Our states have made such splendid progress in reducing the size of the area which burns each year that the importance of fire control is often overlooked or the reductions taken for granted. Fire control—in my opinion—has been the greatest factor leading to a more optimistic outlook on the growth which we now are getting from our timberlands than we had assumed possible thirty or even twenty years ago. An example of this is indicated in a Michigan Department of Conservation report which shows only about 3,884 acres burned there in 1954. It is further reported that, in 1908, some 2 million acres burned.

In my own state of Missouri, out of 7 million acres under organized protection fire swept over about 85,000 acres in 1954. Although no statistics are available for this same area during the period from 1930 to 1940, few people who were familiar with the situation at that time would question a figure for the annual burn of about 2 million acres, and most of them would call this a minimum. Perhaps half of this area burned each year.

I never want to repeat an experience which I had in March of 1941. I had climbed to the top of one of the first fire towers which our organization had constructed (we now have 80) and looked out over a vista of tree-covered, rugged hills extending in a circle twelve or more miles in radius. Fires were everywhere, literally, with smoke rising skyward in every direction. There seemed to be blazes by the hundreds. These fires were so numerous and so extensive that, looking out across the surge of hills, I gained the impression of being completely encircled by fire at the horizon. What a hopeless task control appeared to be at that moment!

Increase in Reforestation

Those states which receive assistance from the federal government in fire control also receive some assistance from the Forest Service in their programs of assisting landowners with reforestation projects on idle lands. Tree seedlings are produced in state nurseries and made available to landowners at low cost.

As an example of federal cooperation in my state, one of the nurseries which we operate is owned by the Forest Service, but is leased to us without cost. We, in turn, produce trees for use on the national

forests in our state at cost, besides growing stock for farmers and other landowners.

A few years ago the Lake States and the eastern states were doing the most planting, but lately there has been a tremendous increase in the production of seedling trees and planting work in the southern states, where pines are shaking the economic throne of King Cotton. A couple of years ago, when nearly 700 million trees were planted in the United States, about 400 million of these were planted in the South. Although federal funds for assisting states in the production and distribution of forest tree seedlings has been very small—about $9,500 to each state—it has served to spark the program.

Photo by U. S. Forest Service

FOREST TREE NURSERY at Albany, Georgia. This state nursery has 60 acres of seedbeds and produces 25 million seedlings annually. The production and distribution of stock for forest planting have long been a field of cooperation between federal, state, and private agencies.

Management Assistance

Since industries owning large tracts of forest land have made great progress in improving their management practices over the past decade, emphasis has lately been centered on the problem of better management on small tracts of woodland. Unlike the owners of large areas of timber, the 4 million small-tract owners represent a great diversity of interest and occupation; they are farmers, teachers, business men, professional men, and widows; they are sometimes sportsmen or clubs of outdoor enthusiasts. Most of these people have limited understanding with regard to the management of their forest lands. In most cases in the past they have received very little income from it, so they need encouragement, plus information on the best things to do for these woodlands.

The program of forest management assistance to woodland owners, as carried on by the states with the assistance of the U. S. Forest Service, is almost as important in many states as the fire control itself. Thirty-nine state forestry departments have recognized the needs of the small woodland owners and have developed facilities to supply technical assistance and encouragement. States administering the cooperative forest management work receive some advisory assistance from the federal people with varying proportions of assistance from the U. S. Forest Service. Federal funds are authorized for not more than one-half of total expenditures, but they usually are considerably less than the amount of state funds put into such activities.

Approximately 261 of these cooperative forest management projects were carried on by the forestry departments in 39 states last year. Added together, this means more than 32,000 landowners were given management assistance on their timberlands and almost 3,000 forest products operators were advised and helped. This on-the-ground aid has proved most practical in getting small landowners to adopt better methods of harvesting their timber crop, thus insuring a maximum contribution to their own economy and to the nation's well-being. But best of all, these practices improve and maintain our forest resources.

In Missouri the foresters who render this personal service are known as farm foresters. In other states they are called "service" or "project" foresters; they are sometimes referred to as "local" or "county" foresters. The titles are unimportant, but the jobs are vital.

A few states have active programs in the control of insects and disease. I have looked over some of the equipment used in other states. Although this work has been quite limited, it is another example of federal, state, and private interests teaming up to get a job done that, under most circumstances, would and even could not be done by a single interest. Yet through cooperation good results are achieved.

Although I can speak only for myself, I feel quite sure that all state foresters will want to commend the U. S. Forest Service for fifty years of outstanding progress. They will want to praise the Service for its devotion to its long-time aims, and for its great support in working with us when some of our state organizations were fighting for very existence. We salute the U. S. Forest Service; we hope and believe that it will maintain the high standard of accomplishment which it has rendered and the example which it has set for the programs of the state departments to match.

And we, as state foresters, know that when one loses, all lose—and that when one wins we all win.

Notes

How to Extract Large Wood Samples from Living Trees

Foresters and research workers are sometimes faced with the necessity of obtaining a fairly large sample of wood from a living tree, including all growth rings from pith to cambium. Often the tree is valuable and should be damaged as little as possible, certainly not enough to interfere with growth. Heretofore, the most logical recourse has been to use an increment borer and study the core that is extracted, but for some types of study the extracted wood sample is too small to obtain a reliable measurement of the sample.

At the Lake City (Florida) Research Center of the Southeastern Forest Experiment Station we were confronted with the problem of obtaining wood samples from ten 21- to 35-year-old slash pines (*Pinus elliottii* Engelm.) to make tangential sections ½ by 1 inch at every fifth ring from the pith outwards. Most of the trees were high gum producers of known yielding ability, and it was desirable to remove a minimum of basal area so that tree vigor would not be impaired. A few simple tools were developed for this purpose (Fig. 1). After a small amount of practice it became possible to extract wood samples ½ by 1-½ by 8 inches in size (including pith and cambial layer) with 100 percent success in less than one hour per sample.

The thick, rough bark was first flattened with a drawknife. An increment borer was useful in locating the pith of large trees. The first step in obtaining a sample consisted of boring two parallel 13/16-inch holes, one centered 3 inches above the other, exactly through and extending about ¾ inch beyond the pith. When boring the parallel holes, the color of the chips indicate when the pith has been reached.

After the holes were freed of chips, two ¾-inch wood dowels

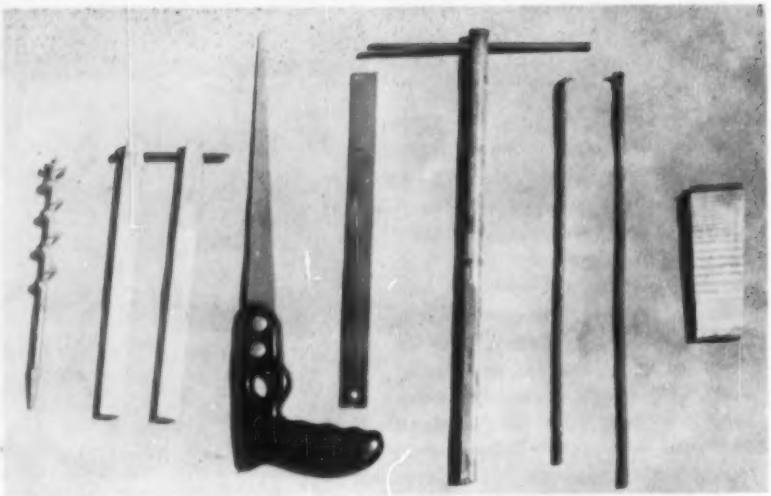

FIG. 1.—Tools shown are (*L* to *R*) 3/16-inch auger bit; two ¾-inch wood dowel guides, with one side flattened slightly; keyhole saw, modified by removing ½ inch of tip and rounding off back to point of first tooth; thin chisel made of old power hacksaw blade 12 inches long, 1 inch wide; ½-inch galvanized pipe 14 inches long, with a "T" handle and one side ground to form a flat surface; two extractors 14 inches long made of ½-inch by 3/16-inch flat steel with ends turned up 90°; and specimen of the wood samples obtained.

with one side flattened were pushed in completely and their flat sides were aligned on the same side of each dowel by inserting a large nail through ¼-inch holes in the ends. By placing the tip of a keyhole saw next to the flat side of the upper dowel, a cut was started and was carried inside the full length of the hole. After it was certain that the cut was deep enough to hold the edge of the saw, the dowels were removed, and the cut was carried downward to the corresponding side of the lower hole. It was found important that the upper hole be cleaned frequently with an auger, as the rounded tip of the saw forced the sawdust upward. The second side of the sample was sawn in the same manner, again using the dowels to guide the initial cut.

FIG. 2.—Slash pine with plugged hole after wood sample has been removed.

After the two sides were sawn almost free, a thin chisel (made of an old power hacksaw blade) was slipped into the saw cuts and tapped with a mallet to finish the cuts which the saw could not quite complete at the lower inner corner. Then the sharpened foot-like tip of one extractor was placed against the sample at the inner end of the upper hole and forced into the wood beyond the pith by pushing the flattened side of a piece of ½-inch pipe along the back of the extractor. After the second extractor was set wedge upward in the lower hole, the sample was broken free by twisting the pipe, and was slipped out of the tree. The opening was plugged with a piece of wood to allow the flow of gum from the tree to fill up the cavity, thereby minimizing the possibility of entry of pathogens or insects (Fig. 2).

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Survival of Some Southeastern Pine Seedlings in Northern Idaho

Although it may seem obvious to most foresters that southern pines, such as loblolly pine (*Pinus taeda*, L.), would not survive in northern climates, actual published evidence of this is very scarce. According to information obtained from the U. S. Forest Service, certain ecotypes of this species have been successfully grown as far north as central Ohio. On the other hand, records of the Arnold Arboretum show that it failed to survive in Boston when grown from Georgia seed. A study of the survival of loblolly pine in northern Idaho was therefore made, more with the purpose of shedding light on the factors that might limit its northern range than to obtain any immediate practical information on the survival of exotics.

Methods

Seedlings were grown from seed in the greenhouse until four months old from time of sprouting and set out in June in two locations, one on the University of Idaho campus (2,600 ft. elevation) and one on an east facing slope (2,800 ft.) near Moscow Mountain. Loblolly pine and longleaf pine (*P. palustris*, Mill.) came from southern Georgia and white pine (*P. strobus*, L.) came from the Adirondacks of New York.

The first group on the campus included 13 seedlings of each of the three species planted in clay pots, one to a pot. The second group on the mountain included 15 white pines and 15 loblolly pines in full shade and the same number of each species in full sun. Seedlings were set out six inches apart in a clear-cut Douglas-fir stand and kept clear of all weeds. Maximum-minimum thermometers were kept next to the seedlings in both locations in shelters placed directly on the ground.

Results

The first series of sub-freezing nights of the autumn as recorded on the campus occurred in early November. Maxima during the day were as high as 60°F. and at night about 27°. After nearly a week of these fluctuating temperatures, 11 out of 13 loblolly pines on the campus turned almost entirely bronze color except at the bases of the leaves. The other two species were unaffected. Bronzing has been previously observed on this pine in its natural habitat, and is not necessarily killing.[1] Those on the mountain showed no bronzing although temperature fluctuations were similar.

No further effects on the campus plot were noticed until January when air temperatures near the ground fell to —11°F. and hovered near this point every night for about three days. Longleaf pine seedlings began to show damage to the leaves where they projected above the snow in late January. The leaves usually turned white at the tips and this progressed downward during the next week or two, the color later changing to brown. In spite of this, all but one longleaf pine survived and proceeded to grow in the spring.

Loblolly pines on the campus were buried in snow during the cold weather of January and only in March showed ill effects which consisted of the bronzed leaves turning brown. But in spring only one of these died, the others all sprouting from the buds. White pines showed no damage whatever.

On the mountain, seedlings planted in full sun suffered severely from drought during July and August in spite of watering twice a day. White pine and loblolly pine suffered equally and only three seedlings of each survived by October in the unshaded plots. However, in the shaded location all seedlings survived the summer and were protected by snow into February against severe cold. The greatest damage to the shaded plots occurred in March when high maxima and low minima (about 25°F.) were recorded for a number of days. Under these conditions the loblolly pine suffered severely, but the white pine showed no effects. By April, 10 out of 15 loblolly pines in the shaded plots turned a yellowish color and later became brown and dried up. Three of each species were killed by frost heaving and two more of each of unknown causes. This left 10 white pines in the shaded plots, two in the unshaded, and no loblolly pines in either.

[1] Wakeley, P. C. Planting the southern pines. U. S. Dept. Agric. Agriculture Monog. 18. 1954.

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Loblolly Pine Takes Over Black Locust Planting

Foresters generally are aware of the past failures resulting from indiscriminate planting of black locust.

However, this story is so dramatically illustrated on the Clemson College Land Use Area that it might bear retelling—if only for the benefit of the younger foresters who did not have the opportunity to experience the heyday of the CCC and WPA.

In 1937, alternate terrace bands were block planted with black locust and loblolly pine, by WPA labor. This particular area involved 6 acres.

Today—17 years later—some of the pines are 46 feet tall, and 9.7 inches d.b.h., while the locust seldom exceed 10 feet in height and 1.2 inches in diameter. Less than 50 percent of the original locust stand is alive today, but many of the survivors are badly damaged by the borer and will pass out of the picture within the next five years.

But this isn't the whole story. For the past five years the adjacent pines have been scattering seed among the struggling locust plantings. The seed are catching and today one-third of the locust plantings have been taken over by the natural pine seeding.

Certainly it doesn't take an "alphabetical" forester to predict what will be the successful aspect

here 10 years from now. The pine will take over, and that's that!

Just what effect the locust has had in improving the site, thereby serving as a nurse crop, the writer is unable to say. However, foresters in this neck of the woods no longer recommend black locust for planting *except* under very special conditions.

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A Method for Photographing Roots[1]

Ecologists have generally resorted to sketches or to photographs of root systems removed from the soil to record their observations on root distribution. Photographing partially excavated roots is often unsatisfactory because they are frequently gray or very dark in color and blend with the soil behind them.

A method whereby roots of shrubs and trees can be photographed in their natural position has been used in California. It consists of making an excavation on one side of the stem, carefully following along major lateral roots with a shovel and isolating the smaller roots from the surrounding soil with an ice pick. Close to the tap root only the ice pick is used. The roots on the other side of the stem are still firmly held by the soil and the entire plant remains in its normal, upright position. After the loose soil is thrown out of the hole, the roots are sprayed with paint from pressurized cans. The paint which has adhered to the soil behind is removed by chipping a thin layer of soil off with the ice pick. Thus the dark background for maximum contrast is restored. The roots can then be photographed.

Either aluminum paint or yellow enamel are ideal for both color and black-and-white shots. The roots of a nine-year-old ponderosa pine tree in Figure 1 were sprayed with aluminum paint; roots of a 30-year-old Mariposa manzanita bush in Figure 2 were painted with yellow enamel. The photographs were taken in April, 1952.

This method has been developed independently for photographing grass roots *in situ*.[2]

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[1]Work done in connection with investigations carried on cooperatively between the University of California and the California Department of Fish and Game. Work was done under Federal Aid in Wildlife Restoration Act, Pittman-Robertson Research Project California 31-R entitled "Effects on Brush Removal on Game Ranges in California."

[2]Haas, H. J., and G. A. Rogler. 1953. A technique for photographing grass roots *in situ*. Agron. Jour. 45(4):173.

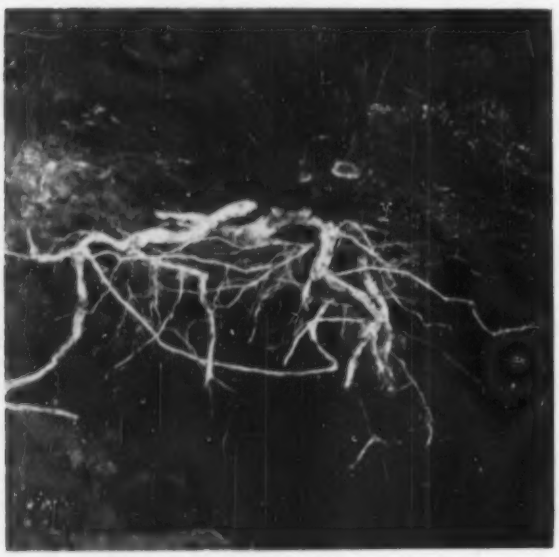

FIG. 1.—Roots of a nine-year-old ponderosa pine sprayed with aluminum paint for photographing.

FIG. 2.—Roots of a 30-year-old Mariposa manzanita bush painted with yellow enamel for photographing.

Shade and Tree Form in Pines[1]

R. R. Reynolds' splendid article on "Growing Stock in the All-Aged Forest" in the October 1954 issue of the JOURNAL OF FORESTRY contains this paragraph:

"A good stocking of small trees is desirable in portions of the all-aged forest to insure natural pruning. The number of trees needed for this purpose, however, is much less than in even-aged stands because competition from the large trees helps to clean the small ones."

It is very difficult either to prove or disprove this second statement but there is some evidence bearing on it that may be worth recording. This is recorded at this time because there seems little likelihood that the writer will have an opportunity to gather additional factual information to supplement what he has already acquired.

During the period 1928 to 1939 I was working with the influence of light on the growth of tree seedlings, under both natural and artificial canopies. I noted that where clumps of natural reproduction had followed a seed tree cutting, the tree in the center of the clump tended to be taller than those on the periphery. This might have been due to the influence of the other trees in shading the lateral branches and it might have been due to their creating a more favorable environment otherwise for the center tree, or to the soil being more fertile in the center. I also noticed that trees that were completely shaded from above by either natural or artificial canopies tended to develop about the same general form as open grown trees, that is, that laterals developed almost as rapidly as the terminal, giving a rounded shape to the pines.

This suggested further study to determine whether form in Lake States pines was influenced most by intensity of light or by the relative amounts of light that impinged on the terminal bud of the tree as compared with that impinged on the buds at ends of lateral branches.

In a dense 12-year old jackpine stand the relationship between terminal and lateral growth was determined for the last five year period. Each tree measured was classified as dominant, codominant, intermediate, or over-topped. It was found that the ratio between terminals and lateral growth followed one pattern for dominant and over-topped trees which would tend to give both of them relatively long branches in comparison with the central stem, whereas the form for codominants and intermediates tended to give them light branches of short length in comparison with the terminal.

Further investigation was made through an experiment set up in the nursery. Some trees were completely shaded with shading cloth while others were completely shaded except for the terminal bud clusters. At the end of the first growing season, the ratios between new terminal length and new lateral length was determined but showed no significant difference with shading methods. At the end of the second growing season, however, the difference was very striking. Where all buds were shaded the ratio of terminal to lateral length was approximately the same as for unshaded trees. Where all buds except the terminal cluster were shaded, the shoots from shaded buds were greatly shortened.

The conclusion to be drawn from this is that it is not chiefly the absolute intensity of light which determines the form of a developing pine tree but rather the ratio between the amount of light which strikes the terminal and the amount which strikes the buds on the tips of laterals.

The application to silviculture is obvious. If small laterals and early self pruning are desired, shading from the side is necessary. This conclusion is, of course, in agreement with the first sentence of the paragraph quoted from Reynolds but throws a certain amount of doubt on to the general corrections of the second.

HARDY L. SHIRLEY
State University of New York
College of Forestry, Syracuse

[1]This note is based on work done by the writer at the Lake States Forest Experiment Station, St. Paul, Minnesota.

Rescue of Lost Child

The people up in New Hampshire still think the rescue of Pamela Hollingsworth, the five-year-old lost for eight days on Mt. Chocorua, one of the greatest services ever performed by the White Mountain National Forest. The entire organization of the search fell on the forest staff, and entailed, as all prolonged rescues do, setting up emergency communications, calling out canteen workers, keeping records of what areas had been covered, planning what areas were to be covered next, and keeping track of the searchers.

Aided by national guardsmen, college students, and volunteer help from all over the state and Massachusetts, the Forest Service combed every acre of the sprawling mountain. Pamela kept on the move, however, and eventually she some rescuers who were headed up a trail already covered to start their searching at a point higher up. She was in fine condition too, despite her diet of water and leaves and exposure to freezing temperatures and rain.

Since that time the White Mountain National Forest men have been called out on every search within the forest boundary.

Reviews

America's Demand for Wood 1929-1975

By Stanford Research Institute. 404 pp. Illus. Prepared for Weyerhaeuser Timber Company, Tacoma, Wash. 1954.

This report (and its companion-piece, a 95-page handsomely illustrated summary report bearing the same title) is the outcome of the Weyerhaeuser Timber Company's announcement that it would make public the results of the study which it commissioned the Stanford Research Institute to undertake in 1953.

The stated purpose of the report is to project estimates of the consumption (which the report refers to as demand) of each of the major wood products in the United States to the target year 1975, and to translate these consumption estimates in terms of the volume of logs and bolts delivered at millsites. In the process of meeting this objective, the Stanford research group has compiled an imposing, interesting, and informative document.

In essence, the method of estimating future wood consumption has involved correlating actual consumption of each wood product from 1929 to 1952 with population, gross national product (or some derivative of gross national product), and trend (a composite of price factors, consumers preferences and miscellaneous factors). With forecasts of population and gross national product growth at hand, it was a relatively simple matter to use the estimating equations to forecast wood products consumption in 1960, 1965, 1970, and the target year of 1975.

In the case of lumber, a refinement in the estimating equation gave special recognition to the expectation that lumber prices will continue to go up faster than prices of competing materials. The refinement is open to some criticism on the grounds that no study of timber supply was made; hence, the magnitude of anticipated price rises is mere conjecture.

These are the Stanford Report estimates of consumption of major timber products in 1952 and 1975:

		1952	1975
Lumber	(Billion bd. ft.)	40.7	44.6
Paper and paperboard	(Million tons)	29.0	53.5
Softwood plywood and veneer	(Billion sq. ft.)	3.3	7.5
Hardwood plywood and veneer	(Billion bd. ft.)	1.0	1.4
Fuelwood	(Million cords)	50	26

In spite of continued displacement because of price and consumer preference factors, lumber use is expected to gain as a result of the great increases in population and gross national product. Paper and paperboard use faces an impressive expansion in line with the expected growth of the national economy. Plywood and veneer consumption will also expand.

Only fuelwood among the major timber products is expected to decline, and here the forecasted drop is quite precipitous. Other timber products—such as cooperage, piling, poles, hewed mine timbers, hewed railroad ties, and distillation wood—are expected to show little overall change by 1975.

Except for some confusion of terminology (which this reviewer feels could have been avoided), and possibly some overenthusiasm in the forecast of fuelwood decline and the expanded use of mill wastes, the report stands as an impressive, well prepared document. It brings together a vast accumulation of useful, pertinent data, and subjects them to a clear, well written analysis. Undoubtedly, the report will be a standard reference work for many years to come.

The Weyerhaeuser Timber Company is to be commended for making the report available for the use of foresters and the general public.

LEE M. JAMES
Michigan State College

Manual of Southern Forestry

By Howard E. Weaver and David A. Anderson. 368 pp. Illus. Interstate Printers and Publishers, Inc., Danville, Ill. 1954. $3.75.

This book, prepared by two members of the research and education department of the Texas Forest Service for students of vocational agriculture in the South, meets a definite need in a workmanlike way. Among its outstanding features are the practical ring of its recommendations, its complete and up-to-date coverage of the field, its excellent organization, and its business-like style.

The thirteen compact chapters deal with introduction to forestry, tree study, forest measurements, forest environment, cutting methods, artificial reforestation, forest management and economics, forest range management, wood identification and uses, harvesting, manufacturing and marketing, wood preservation, protection from fire and from other forest enemies. Each chapter is a model of adequate treatment of a field of forestry and effective use of words and space.

The volume is of handy size, the print is large, and the headings make it an easy matter to locate any desired topic. The illustrations are well chosen and effective. The tables are significant and have been arranged for the reader's easy comprehension. Supplementary information and additional aids are provided in the appendix, glossary, and bibliography, and in lists of review questions and suggested activities at the end of each chapter. Frequent typographical errors unfortunately detract from the otherwise excellent format.

The authors have carefully chosen their materials from what is obviously a comprehensive knowledge of the history, science, and practice of forestry. The new topics and the time-tested ones are all treated, without excess verbiage and without skimping. The result is a practical book in simple language which makes no demand on

the reader except that of a desire for information.

The map and tables in the opening chapter represent the South as including the states from Virginia, Tennessee, Arkansas, and Oklahoma to the Gulf of Mexico. The authors declare in their preface, however, that their purpose is to provide information regarding the various phases of forest management, particularly applicable to the western part of the Deep South. The statement is made on page 91 that "shortleaf pine is the only pine in the South that can produce merchantable size timber from sprouts." For the western part of the Deep South, this statement would undoubtedly be correct. For the South as defined in chapter one and as ordinarily interpreted, the statement should be amended to include pond pine, which dominates several million acres in the Atlantic coastal plain.

Manual of Southern Forestry will be an invaluable aid in the teaching of vocational agriculture and in the promotion of better management on farm woodlands. Southern foresters will find that the book, in addition to being a useful reference, will stir their pride in their region and in their profession.

WILLIAM D. MILLER
North Carolina State College

The Pruning Manual

By Everett P. Christopher. 320 pp. Illus. MacMillan Company, New York 11, N. Y. 1954. $5.

In this neatly put up and handily organized text we have a modernization of Bailey's treatise, first published in 1898 and for half a century the standard in its field. Prof. Christopher, a horticulturist, has ably covered a wide field at the popular level. The book has 19 chapters plus an index, that cover everything from pruning apple trees, roses and shade trees to nursery practice and grafting, with something about tools and techniques.

The chapter on forestry has only 8 pages, of which two are on Christmas tree pruning. Perhaps this is enough in a general text, but it is hardly adequate for such a controversial subject. The professional forester will find some of it inaccurate or incomplete, none of it new. Illustration 8 shows a red pine plantation, 100 percent pruned up 8 feet—the makings of an argument any time.

This is a nice manual on horticultural pruning; its forestry is very incidental.

D. B. COOK

Principles of General Ecology

By Angus M. Woodbury. 503 pp. Illus. Blakiston Company, Inc., New York, N. Y. 1954. $6.

Any ecologist who attempts to prepare a general textbook in his field faces a monumental task, not only because of the tremendous mass of material from which he must select examples to illustrate principles, but also because the principles themselves have been inadequately defined. Add to these problems his fellow ecologists who themselves seldom agree on exactly what ecology is, and the task becomes nearly hopeless. Perhaps the preparation of a textbook that will meet the entire approval of any ecologist other than the author himself may be an impossibility.

Despite these difficulties Dr. Woodbury's textbook comes nearer meeting the demands of the dynamic brand of ecologist than anything that has hitherto been written. The author has divided the subject into three parts—the first dealing with general ecological considerations; the second, with the physical environment; and the third, with biotic inter-relationships.

In the first part he considers the character and spirit of the subject ecology, and presents an excellent summary of its historical development. The ecological distribution of organisms on the earth is considered according to both time and space. Also in the first section are discussed briefly some of the general energy relationships whereby organisms utilize energy, pass it along to other organisms, and ultimately return it to the environment to be used again.

Section 2 deals with the physical environment. This subject is treated more completely than is usual in similar texts. The principles discussed are illustrated by interesting and well arranged diagrams of value to the student.

Part 3 deals with biotic inter-relationships. It contains a chapter on biotic communities, both water and land communities; a chapter on the development of biotic communities; one on community analysis; one on conditions of existence, referring especially to energy, space, shelter, protection, and comfort; food relations, including a discussion of food change; and methods of reproduction and its influence on species persistence or survival.

Following this series of chapters, population problems ar considered. Then follows a consideration of dispersal and evolution, biotic rhythms and migrations, adaptations, and historical and geographic distribution. Three chapters deal with various aspects of symbiosis, using that term in its broadest sense, dealing with societies of various kinds. The final chapter discusses ecology in human affairs, and contains points with which many might disagree. Nevertheless the ideas are stimulating and give evidence of solid thought about the implications of ecology in reference to the well-being of man.

After reading this text, one is left with a feeling of satisfaction even though not entirely agreeing with all the author's viewpoints. Dr. Woodbury has produced an unusually valuable book which will be useful in the teaching of ecology anywhere, but especially in the western part of the United States.

SAMUEL A. GRAHAM
University of Michigan

Modern Timber Engineering

By W. F. Scofield and W. H. O'Brien. 231 pp. Southern Pine Association, New Orleans, La. 1954. $2.

This fourth edition of a very practical book presents the latest information in basic timber design.

The previous edition has been completely revised and new material added.

T. E. Brassell, assistant professor of civil engineering at the University of Alabama, has enlarged and revised the previous book written by the late W. Fleming Scofield and W. H. O'Brien. These engineers present simplified and illustrative material that can be used by students of engineering, wood technology, and architecture as well as those who are engaged in the various phases of these professions.

The first chapter, devoted to the structure and characteristics of wood, is particularly helpful to those who are not familiar with the basic features of a piece of wood and how it reacts under different conditions. A portion of the book is also devoted to strength properties, loads, and stresses in the different planes of a piece of wood.

There are numerous diagrams and formulas illustrating fabrications of beams, columns, and trusses, in addition to decks and bridge floor systems. Some problems are worked out within the chapters and others to be worked are found at the end of various chapters.

Included in the book is a chapter on glued laminated structural lumber with an explanation of the types and differences of certain glues used in laminating. Since the use of laminates for structural purposes on a large scale is relatively new, this subject is most pertinent.

Wood-plywood construction is clearly described, including the various methods for calculating the strength of plywood. The use and effect of various wood preservatives and fire-retardants are briefly but sufficiently explained.

The final chapter is devoted to the design of Lamella roofs. This roof construction was invented in Europe and has been used in this country for pleasing architectural appearance as well as for providing clear spans of great width.

The book is a timely one because of the extensive use of new methods and wood materials in our present-day building construction programs. It should be a "must" for those who design wood structures and the various fasteners for fabricating them.

ODIE L. FITZGERALD
Louisiana Polytechnic Institute

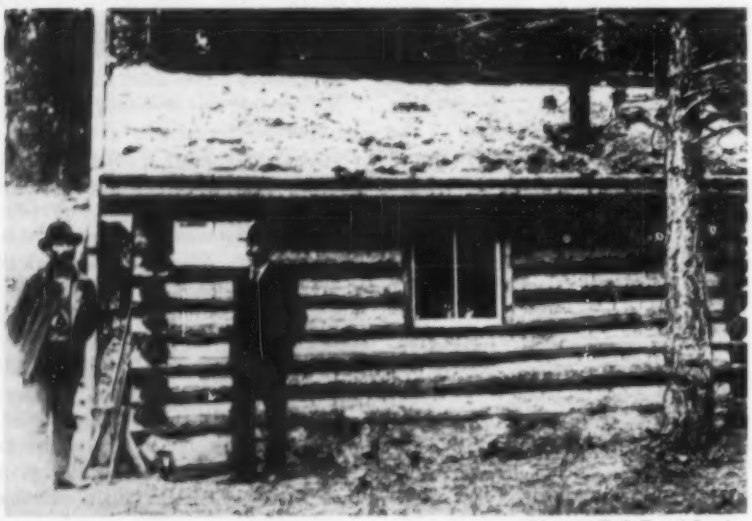

Photo by U. S. Forest Service.

THIS FOREST RANGER'S cabin constructed in 1899 on the Bitterroot National Forest in Montana is believed to be the first Forest Service building.

Photo by U. S. Forest Service

A MODERN ranger station on the Dixie National Forest, Utah.

Publications of Interest

The American Forest Products Industries, 1816 N St. N.W., Washington 6, D. C., has issued two useful publications recently. *The Forest Adventures of Mark Edwards* is a pamphlet prepared for children in grades four to six. It is a fictionalized presentation for teaching forest conservation and gives the child a review of the country's forest regions. *Bibliography of Forest Industry Educational Materials* lists educational material that may be secured from forest industry sources. An impressive array of motion pictures, booklets, and other material is available from these sources.

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The *Forest Policy Statement* of the National Lumber Manufactures Association as amended and approved November 1954 is available in booklet form from that organization, 1319-18th St. N.W., Washington 6, D. C.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, State University of New York College of Forestry*

Range Management Section Compiled by FRANCES FLICK, *Library, U. S. Department of Agriculture*

General

Forest Research in New England; A Report of the Sub-Committee on Forest Research. Ed. by H. I. Baldwin. 64 pp. Northeastern Wood Utilization Council, Box 1577, New Haven 6, Conn. 1954. Bul. No. 42. $2.00.

The History of Holly in Murals. By H. W. Dengler. 24 pp. The Holly Society of America, Inc. Write Charles A. Young, Jr., Bergner Mansion, Gwynn Falls Park, Baltimore 16, Md. 50 cents.

The Web of Life; A First Book of Ecology. By J. H. Storer. 144 pp. Illus. Devin-Adair Co., New York. 1954. $3.00.

World Festival of Trees. 74 pp. Food and Agric. Org., Rome, Italy. 1954. 75 cents (Columbia Univ. Press, New York 27).

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Society Affairs

Officers and Members of the Council, 1954-1955

E. L. DEMMON, *President*
Southeastern Forest Experiment Station
Federal Building
Asheville, N. C.

WILLIAM J. BROWN
Woodlands Department
Kimberly-Clark Corporation
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C. HUXLEY COULTER
Florida Forest Service
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Sacramento 14, Calif.

STANLEY G. FONTANNA
School of Natural Resources
University of Michigan
Ann Arbor, Mich.

PERCY D. HANSON
U. S. Forest Service
Federal Building
Missoula, Mont.

EDWIN F. HEACOX
Weyerhaeuser Timber Company
Tacoma 1, Wash.

HENRY CLEPPER, *Executive Secretary*
Mills Building, 17th Street at Pennsylvania Avenue, N. W.
Washington 6, D. C.

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State University of New York
College of Forestry
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J. HERBERT STONE
U. S. Forest Service
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Portland 8, Ore.

RUTHFORD H. WESTVELD
Department of Forestry
University of Missouri
Columbia, Mo.

SCHOOL BOX SCORE
MEMBERSHIP, 1955 FISCAL YEAR

School	Student applications received		
	Feb. 1955	Total 1954 fiscal year	Total 1955 fiscal year
Alabama Polytechnic Institute	0	7	18
University of California	5	21	15
Colorado A & M College	2	18	2
Duke University	0	12	1
University of Florida	0	16	2
University of Georgia	0	38	14
University of Idaho	1	29	1
Iowa State College	1	32	5
Louisiana Polytechnic Institute	0	0	0
Louisiana State University	0	14	13
University of Maine	0	16	7
University of Massachusetts	0	16	6
Michigan State College	0	25	28
University of Michigan	2	22	8
University of Minnesota	2	21	6
University of Missouri	0	20	7
Montana State University	0	19	10
State University of New York	3	23	16
North Carolina State College	0	19	20
Oregon State College	1	17	5
Pennsylvania State University	4	33	28
Purdue University	0	19	24
Utah State Agricultural College	0	8	7
University of Washington	1	28	16
West Virginia University	1	21	5
Yale University	12	3	15
Totals	35	497	279

SECTION BOX SCORE
MEMBERSHIP, 1955 FISCAL YEAR

Section	Applications received[1]		
	Feb. 1955	Total 1954 fiscal year	Total 1955 fiscal year
Allegheny	5	68	34
Appalachian	0	48	25
Central Rocky Mountain	2	26	3
Central States	2	80	60
Columbia River	4	56	12
Gulf States	5	57	25
Inland Empire	1	39	2
Intermountain	0	14	8
Kentucky-Tennessee	0	5	0
New England	12	54	31
New York	3	40	19
Northern California	6	34	19
Northern Rocky Mountain	0	35	10
Ozark	1	49	14
Puget Sound	2	61	19
Southeastern	2	128	42
Southern California	3	2	3
Southwestern	1	7	1
Upper-Mississippi Valley	4	64	13
Washington	0	7	1
Wisconsin-Michigan	1	11	6
Totals	54	885	347

[1]Student, Junior, Affiliate, Associate (Initial) grades only.

1955 Membership Progress

To stimulate applications for reinstatement to Society membership, the Council voted to remit all back dues of former members if application is made during the period November 1, 1954—December 31, 1955. Thus a member whose membership was terminated for arrears in dues may apply for reinstatement without the payment of any arrears. Already this action of the Council is reflected in an encouraging increase in requests for reinstatement.

The schools have been most cooperative during the new membership year. The "box scores" appearing monthly in the JOURNAL OF FORESTRY show that the number of applications received for Student membership has already exceeded, in some cases, the total number for the 1954 fiscal year. The increase in the total number of applications received in the initial grades for the 1954-1955 (two-month) comparative period is 35 percent. An excellent start has been made but the continued cooperation of schools, members, Sections, and Chapters is needed to make 1955 a banner membership year.

As of November 30, 1954 the membership was 9,883 (Tables 1, 2, and 3). Terminations during the year were 661 of which 465 (or less than 5 percent of the membership) were dropped for nonpayment of dues. Including 110 reinstatements, 1,092 names were added to the membership list resulting in a net increase of 431.

In the over-all 1954 increase is reflected the candidacies of 292 applicants for the grade of Junior Member from among forestry graduates of accredited schools of forestry. An additional 1,391 applications for the other grades were received making a total of 1,683 applications processed.

The number of Student Members continues to be high. As of November 30, 1954, there were 666; 497 students applying for this grade during the year.

Definition of a Profession

First, a profession is an occupation for which the necessary preliminary training is intellectual in character, involving knowledge and to some extent learning, as distinguished from mere skill.

Second, it is an occupation which is pursued largely for others and not merely for oneself.

Third, it is an occupation in which the amount of financial return is not the accepted measure of success.

—The late Justice Brandeis, U.S. Supreme Court

TABLE 1.—COMPARATIVE S.A.F. MEMBERSHIP, AS OF NOVEMBER 30

Grade	1953	1954
Fellow	62	69
Member	3,687	3,861
Junior	4,416	4,458
Student	510	666
Affiliate	487	529
Associate	211	220
Corresponding	64	65
Honorary	15	15
	9,452	9,883
Increase		431

TABLE 2.—MEMBERSHIP BY SECTIONS NOVEMBER 30, 1954

Section	Rank	Total	Junior	Member	Fellow	Affiliate	Associate	Student
1. Allegheny	7	609	275	234	4	15	13	68
2. Appalachian	5	647	300	273	4	26	5	45
3. Central Rocky Mountain	14	255	86	136		7	5	21
4. Central States	12	368	174	132		13	9	40
5. Columbia River	2	892	455	354	6	45	14	18
6. Gulf States	4	707	361	236	2	66	16	26
7. Inland Empire	18	206	99	75	1	10	5	16
8. Intermountain	19	190	71	101		3		15
9. Kentucky-Tennessee	19	190	76	98		8	6	2
10. New England	8	592	242	232	5	56	15	42
11. New York	10	399	136	190	5	17	17	34
12. Northern California	3	725	350	270	9	43	23	30
13. Northern Rocky Mountain	17	208	90	93		4	2	19
14. Ozark	13	344	152	114	1	42	5	30
15. Puget Sound	9	560	241	211	5	51	12	40
16. Southeastern	1	1,008	556	304	2	41	21	84
17. Southern California	20	92	40	39	3	7	3	
18. Southwestern	16	213	102	96	1	13	1	
19. Upper Mississippi Valley	11	381	157	146	3	17	10	48
20. Washington	15	248	50	158	13	2	25	
21. Wisconsin-Michigan	6	645	256	247	3	42	12	85
No Section Affiliation[1]	—	324	189	122	2	7	1	3
Corresponding	—	65						
Honorary		15						
Total membership		9,883	4,458	3,861	69	529	220	666

[1]Includes 133 inactive and other members in the U. S. and foreign countries who have requested that they not be designated as members of any Section.

TABLE 3.—S.A.F. MEMBERSHIP, FIVE-YEAR PERIOD
(As of November 30)

Year	Fellow	Member	Junior	Affiliate	Associate	Student	Honorary	Corresponding	Total
1950	57	3,313	3,471	224	201		12	52	7,330
1951	54	3,467	3,861	269	206	550	13	55	8,475
1952	62	3,563	4,245	381	213	550	13	58	9,085
1953	62	3,687	4,416	487	211	510	15	64	9,452
1954	69	3,861	4,458	529	220	666	15	65	9,883

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The President's Column

E. L. DEMMON

On February 1 the U. S. Forest Service celebrates its Golden Anniversary. On that date in 1905 the Forest Service was created in its present form in the Department of Agriculture. This significant anniversary is being recognized by the Society of American Foresters by devoting a major part of this issue of the JOURNAL to accounts of the history, work, and accomplishments of the Forest Service. Because that organization has played such an important role in the development of forestry in the United States during the last 50 years, the Society is in fact saluting not only the Forest Service but the progress which stemmed from it and from the accomplishments of all forestry agencies—private as well as public.

In the early days of this century, forestry in the United States was in its infancy. The Society of American Foresters had just been launched (1900) and all of its handful of members were in federal employ. The Society's first president was Gifford Pinchot, also first chief of Forest Service. For many years thereafter the Society officers were either Forest Service or ex-Forest Service men and the great majority of the membership was made up of Forest Service employees. Now this situation has greatly changed. Only three of the Society's present 12 officers and Council are members of the Forest Service; over half of present Society membership is composed of foresters in private employ and I regret to add that there are quite some number of Forest Service employees fully qualified for membership in our Society who are not presently members.

I am proud to have been a member of the U. S. Forest Service for over 30 years. Well do I recall my first summer forestry job as a forest guard on a national forest in Wyoming, at the munificent salary of $75 per month. As those were the days before good roads, and automobiles were still a novelty, I had to buy a horse so that I could get around my district. Many another young forester fresh out of forestry school has received valuable field experience with the U. S. Forest Service. I think all will agree that this organization has contributed greatly to the education of many budding foresters.

The Forest Service has always maintained high ideals of public service. Not everyone has always agreed with all of its policies, but no one can say that it has not tried to do a creditable job, representing the interests of all the American people. Therefore it is timely and fitting that the profession of forestry as represented by the Society of American Foresters pay tribute to this great organization on this, its fiftieth birthday. May it continue to point the way towards ever greater forestry progress in the future, to the benefit of the American nation.

E. L. Demmon

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Kentucky-Tennessee Section Meeting

Some 70 members of the Kentucky-Tennessee Section met at the Hermitage Hotel at Nashville, Tenn. on December 3-4, 1954. Chairman Kenneth

J. Seigworth presented a plaque to Walter Amamn of the *Knoxville Journal* for his outstanding writing on forestry subjects. The honorable Jim McCord, former governor and present commissioner of the Tennessee Conservation Department, was the speaker at the banquet. Donnell E. O'Brien was toastmaster.

Charles R. Page, Chattanooga consulting forester, is new Section chairman. Other new officers are John W. Lehman, vice chairman, and Russell Stadelman, secretary-treasurer.

The meeting saw 14 committees reporting on "What can our Section do" after a year's study following a meeting at Gatlinburg, Tenn., a year ago. Tom Ramke, chairman of the Objectives and Projects Committee, recommended 16 projects for the next 5 years. These are being circulated to Section members to determine priority.

SAF President E. L. Demmon attended and pointed out the opportunities for the Section in connection with the annual meeting of the SAF in 1956 at Memphis.

Coming Events

Southern Forestry Conference

The Forest Farmers Association, March 3-4, at the Edgewater Gulf Hotel, Biloxi, Miss.

American Society of Photogrammetry

March 7-9, and American Congress on Surveying and Mapping, March 9-11, both at the Shoreham Hotel, Washington, D. C.

New England Section

Annual meeting, March 10-11, Somerset Hotel, Boston.

20th North American Wildlife Conference

The North American Wildlife Conference will hold its 20th meeting March 14-16 in Montreal, Canada. Theme of the meeting will be "Natural Resources Use—A Continental Challenge."

Gulf States Section

The annual meeting of the Gulf States Section will be held at the Buena Vista Hotel, Biloxi, Miss., May 26 and 27.

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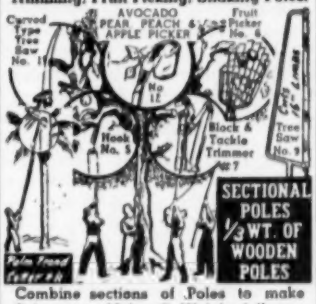
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Northern California Section Meeting

The annual meeting of the Northern California Section was held December 4 in San Francisco. More than 300 foresters were in attendance. Under the chairmanship of John Callaghan of the state Division of Forestry, the program was devoted to the theme "Utilization—the Key to Good Forest Management."

George M. Jemison, director of the California Forest and Range Experiment Station introduced the subject, speaking on "The Forester and Wood Utilization." Other speakers included A. T. Hildman, Michigan-California Lumber Co.; Walter F. Holzer, Crown-Zellerbach Corp.; John Ritchie, Douglas Fir Plywood Assn.; William H. Holmes, Soper-Wheeler Lumber Co.; William D. Hagenstein, Industrial Forestry Assn.; and G. S. Gilligan, Stanford Research Institute.

DeWitt Nelson, director of the California Department of Natural Resources was master of ceremonies at the evening banquet where A. Starker Leopold of the University of California spoke on wildlife and land use in Alaska.

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Membership Applications and Advancements

Proposals for admission, advancement, and reinstatement received in the Society office during the month of December are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of March 1, 1955. Communications from voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allegheny Section

Student Grade

PENNSYLVANIA STATE UNIVERSITY

Fenstermaker, F. L. — Paxton, W. C.
McNaney, J. J. — Reinsel, E. N.

WEST VIRGINIA UNIVERSITY

Swank, G. W.

Junior Grade

Jewell, F. F., Plant Pathology, W. Va. Univ., Morgantown, W. Va.; Mich. State, B.S.F., 1951. Reinstatement.

Toller, B., Gilbert, W. Va.; W. Va. Univ., B.S.F., 1951. Reinstatement.

Van Devender, I. G., W. Va., Cons. Comm., Marlinton, W. Va.; W. Va. Univ., B.S.F., 1950. Reinstatement.

Member Grade

Adams, J., Forester, Western Md. Railway Co., Mt. Lake Park, Md.; W. Va. Univ., B.S.F., 1943; Univ. of Mich., M.F., 1946. (Junior, 1949).

Hobart, W. L., Asst. Dist. Forester, Dept. of Forest & Parks, Still Pond, Md.; Univ. of Mich., B.S.F., 1951. (Junior, 1951).

Snyder, C. E., Plantation Mgr., Firestone Plantations Co., Harbel, Liberia, W. Africa. (Junior, 1945).

Young, C. A., Park Forester, Dept. Recreation & Parks, Baltimore, Md.; Pa. State, B.S.F., 1939. Reinstatement.

Central Rocky Mountain Section

COLORADO A & M COLLEGE

Lehman, R. C. — Scott, J. B.

Columbia River Section

Student Grade

Thornton, G. A.

Junior Grade

Crawford, R. W., Forest Supv., Deschutes Natl. Forest, Bend, Ore.; Ore. State, B.S.F., 1930. Reinstatement.

Davies, H. G., Owner, Salvage Logging Show, Oakridge, Ore.; Ore. State, B.S.F., 1949. Reinstatement.

Ewing, A. D., Log Buyer, Lane Veneer Co., Eugene, Ore.; Iowa State, B.S.F., 1950.

Jackson, C. B., Forester, U.S.F.S., Gold Beach, Ore.; W. Va. Univ., B.S.F., 1954.

Quirin, A. F., General Sales Mgr., Willamette Valley Lbr. Co., Dallas, Ore.; Iowa State, B.S.F., 1942. Reinstatement.

Member Grade

Aydelott, O. L., Tbr. Mgt. Staff Asst., U.S.F.S., Baker, Ore.; Ore. State, B.S.F., 1931. Reinstatement.

Judkins, D. H., Asst. Dist. Forester, Bur. Land Mgmt., Eugene, Ore.; Univ. of Wash., B.S.F., 1934. Reinstatement.

McCambridge, W. F., Forest Entom., Forest Research Center, Juneau, Alaska; State Univ. of N. Y., B.S.F., 1948. (Junior, 1948).

Wiese, R. A., U.S.F.S., Government Camp, Ore. (Junior, 1948).

Affiliate Grade

Fogelquist, F. W., Forester, U.S.D.I., Medford Ore.

Central States Section

Student Grade

UNIVERSITY OF MICHIGAN

Bell, J. T. — Ruggeri, F. C.

Member Grade

Hensler, S. J., Consulting Forester, Hamlet, Ind. (Junior, 1948).

Nicewander, W., Research Asst., Purdue Univ., Lafayette, Ind. (Junior, 34R54).

Gulf States Section

Junior Grade

Mann, A. F., Forester, Hillyer, Deutsch, Edwards, Inc., Oakdale, La.; L.P.I., B.S.F., 1950.

Obye, K. D., Chief Forester, U. S. Gypsum Co., Greenville, Miss.; Iowa State, B.S.F., 1948.

Warriner, W. H., U.S.F.S., Ackerman, Miss.; N. C. State, B.S.F., 1937. Reinstatement.

Williams, E. B., Dist. Ranger, U.S.F.S., Forest, Miss.; State Univ. of N. Y., B.S.F., 1935. Reinstatement.

Member Grade

Austin, D. B., Texas Forest Service, Rusk, Texas. (Junior, 1948).

Burger, T. E., Plant Mgr., General Box Co., Beaumont, Texas. (Junior, 1948).

Dale, E. G., Texas Forest Service, Naples, Texas. (Junior, 1948).

Green, A. E., Texas Forest Service, Woodville, Texas. (Junior, 1948).

Guiher, J. K., Forestry Dept., Stephen F. Austin State College, Nacogdoches, Texas. (Junior, 1948).

Spinney, U. W., Grayburg Tbr. Co., Liberty, Texas. (Junior, 1948).

Wagoner, E., 515 Crescent St., Bryan, Texas. (Junior, 1947).

Affiliate Grade

Brink, L. K., Woodland Cons., Soil Cons. Service, Nacogdoches, Texas; Stephen F. Austin State College, B.S. (Forestry), 1950.

Hansford, R. P., Area Forester, State of Miss., Dekalb, Miss.

Hayden, T. C., Forest Tech., International Paper Co., Nacogdoches, Texas; Okla. A. & M., B.S., (Forestry), 1951.

Inland Empire Section

Student Grade

UNIVERSITY OF IDAHO

Varseveld, F. R.

Intermountain Section

Member Grade

Powers, F. E., Box 635, Salmon, Idaho; Oregon State, B.S.F., 1929. Reinstatement.

Kentucky-Tennessee Section

Junior Grade

Burton, R. P., Asst. Plant Mgr., E. L. Bruce Co., Memphis, Tenn.; Univ. of Fla., B.S.F., 1951. Reinstatement.

Member Grade

Christensen, J. I., Ranger, U.S.F.S., Benton, Tenn. (Junior, 1948).

Crail, C. J., Dist. Forester, Ky. Div. of Forestry, Elizabethtown, Ky.; Purdue, B.S.F., 1951. (Junior, 1951).

Curson, H., Prod. Mgr., General Box Co., Louisville, Ky. (Junior, 1948).

Ritchie, J. L., 1407 Clifton Lane, Nashville, Tenn.; La. State, B.S.F., 1946. Reinstatement.

New England Section

Student Grade

YALE UNIVERSITY

Baker, D. E. — Steinhoff, R. G.
Davenport, J. A. — Sunderland, L. B.
Goudy, A. C. — Thompson, W. P.
Mahoney, H. B. — Twining, G. E.
Noyce, P. B. — Watson, D. A.
Scotton, F. A. — White, M. C.

New York Section

Student Grade

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Junior Grade

Kareiva, V. V., 224 Belmont Ave., Oneida, N. Y.; N. C. State, B.S.F., 1938. Reinstatement.
Salato, M. A., 222 Sanders Ave., Scotia, N. Y. Reinstatement.
Sandstrom, A. C., Box 279, Jordan, N. Y.; State Univ. of N. Y., B.S.F., 1948. Reinstatement.
Stickney, R. A., Forester, N. Y. State Cons. Dept., Bath, N. Y.; State Univ. of N. Y., B.S.F., 1950. Reinstatement.

Member Grade

Craig, W. C., R.F.D. 2, New Berlin, N. Y. (Junior, 1948).
Glider, V., Box 27, Sherburne, N. Y. (Junior, 1948).
Fitzner, W. J., R.D. 1, Elnora, N. Y. (Junior, 1948)
Madison, H., 312 Division St., Northville, N. Y. (Junior, 1948).
Stout, B. B., Black Rock Forest, Cornwall-on-Hudson, N. Y. (Junior, 1948).

Associate Grade

Swanson, G. A., A. F. Beyersvej 21, Copenhagen F., Denmark; Univ. of Minn., B.S., (Natural Science), 1930. Reinstatement.

Northern California Section

Student Grade

UNIVERSITY OF CALIFORNIA

Bouse, T. M. — Waksdal, H. E.
Day, R. J. — Waldron, B. A.
Razzeto, J. H.

Junior Grade

Bellon, A. L., Forester, Bur. of Land Mgmt., Sacramento, Calif.; Univ. of Calif., B.S.F., 1953.
Reese, R. A., U.S.F.S., Susanville, Calif.; Penn. State, B.S.F., 1951. Reinstatement.

Member Grade

Giffen, C. A., Asst. Dist. Ranger, U.S.F.S., Sierraville, Calif. (Junior, 1948).
Herron, D. G., Forestry Aide, U.S.F.S., North Fork, Calif. (Junior, 1948).
Isle, R. W., 1938 Santa Monica Ct., Santa Rosa, Calif. (Junior, 1944).
Lessel, R. L., Dist. Ranger, U.S.F.S., Groveland, Calif. (Junior, 1948).

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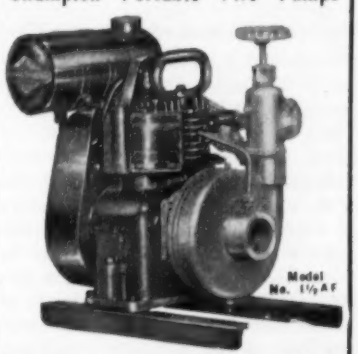

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Neff, T. A., Asst. Dist. Ranger, U.S.F.S., Paskenta, Calif. (Junior, 1948).
Parker, S., Asst. Dist. Ranger, U.S.F.S., Sonora, Calif. (Junior, 1948).
Preuss, W. P., 1475 Vine Lane, Walnut Creek, Calif. (Junior, 1939).
Rahm, N. M., Box 487, Alturas, Calif.; Univ. of Calif., B.S.F., 1937. Reinstatement.

Ozark Section

Member Grade

Anderson, C. G., U.S.F.S., Willow Springs, Mo.; Univ. of Mich., B.S.F., 1931 Reinstatement.

Affiliate Grade

Huggins, R. D., Asst. Dist. Forester, Dierks Forests Inc., Kirby, Ark.; Okla. A & M, B.S., (Forestry), 1952.
Ross, J. C., Crossett, Ark. Reinstatement.

Puget Sound Section

Student Grade

Pierson, D. E.

Member Grade

Vanderwegen, W. L., 400 North F St., Aberdeen, Wash. (Junior, 1948).

Affiliate Grade

Petersen, A., Dist. Asst., U.S.F.S., Enumclaw, Wash.

Southeastern Section

Junior Grade

Bears, W. L., Staff Dev. Forester, Buckeye Cellulose Corp., Perry, Fla.; Penn. State, B.S.F., 1953.
McElhannon, J. E., County Forest Ranger, Ga. Forestry Comm., Jefferson, Ga.; Univ. of Ga., B.S.F., 1942.

Member Grade

Arnott, D., Dist. Forester, International Paper Co., Jasper, Fla. (Junior, 1948).
Fitzgerald, C. H., Ga. Pacific Plywood & Lbr. Co., Steelwood, Ala. (Junior, 1948).
Holley, D. P., Rt. 5, Box 522, Selma, Ala. (Junior, 1948).
Jennings, D. M., 572 Moringview Drive, Montgomery, Ala. (Junior, 1948).
Weekley, P. A., Wildwood Terrace Apts., Florence, Ala. (Junior, 1948).

Southern California Section

Junior Grade

James, M. R., Forester, U.S.F.S., Escondido, Calif.; Univ. of Idaho, G.S.F., 1940.
Pecaro, G. J., Vice President, The Flintkote Co., Los Angeles, Calif.; Iowa State, B.S.F., 1930.
Puhn, W. J., Forest Supv., U.S.F.S., San Diego, Calif.; Ore. State, B.S.F., 1932.

Southwestern Section

Member Grade

Brainard, W. H., Dist. Forest Ranger, U.S.F.S., Alpine, Ariz.; Univ. of Calif., B.S.F., 1935. Reinstatement.
Engstrom, G. E., Box 542, Taos, N. Mex.; Colo. A & M, B.S.F., 1933. Reinstatement.

Affiliate Grade

Sims, J. D., Forester, U.S.F.S., Sacramento, N. Mex.; Utah State Agric., B.S., (Range Mgmt.), 1954.

Upper Mississippi Valley Section

Student Grade

IOWA STATE COLLEGE

Johnson, H. C.

UNIVERSITY OF MINNESOTA

Glain, G. N. — Johnson, J. E.

Junior Grade

Hubbard, A. C., Box 603, Riggins, Idaho; Iowa State, B.S.F., 1952. Reinstatement.

Member Grade

Carter, H. A., 3411 Pillsbury Ave., Minneapolis, Minn. (Junior, 1931).
Hellings, T. V., Minn. & Ont. Paper Co., International Falls, Minn. (Junior, 1948).
Olson, H. E., 3 Hunter Lane, St. Paul, Minn. (Junior, 1948).

Affiliate Grade

Elliott, R. R., Area Supv., Minn. Forest Service, Bemidji, Minn.

Washington Section

Junior Grade

Neupauer, T. W., 319 N. Quincy St., Arlington, Va.; Pa. State, B.S.F., 1950. Reinstatement.

Member Grade

Bernstein, D. A., 1010 S. Wakefield Drive, Alexandria, Va. (Junior, 1948).
Littlehales, E. F., 853 Pinewood Terrace, Falls Church, Va. (Junior, 1948).
Sadaki, W. K., 1730 73rd Place, Hyattsville, Md. (Junior, 1948).

Wisconsin-Michigan Section

Junior Grade

Decker, T. P., Rt. 1, Woodlake, Lake Geneva, Wis.; Mich. State, B.S.F., 1948. Reinstatement.
Evenson, C. M., Forester, U.S.F.S., Park Falls, Wis.; Univ. of Minn., B.S.F., 1934. Reinstatement.
Fox, R. C., Forest Ento., Mich. Cons. Dept., Lansing, Mich.; Mich. State, B.S.F., 1948; M.F., 1949.

Member Grade

Braidwood, A. K., Dist. Forester, Mich. Dept. of Cons., Onaway, Mich. (Junior, 1947).
Bruning, H. R., Ranger, Escanaba Paper Co., Newberry, Mich. (Junior, 1948).
Herman, J. A., 3625 W. Grand River, Howell, Mich. (Junior, 1948).
Holmes, H. E., Forestry Asst., Consumers Power Co., Lake City, Mich. (Junior, 1948).
Lebold, W. R., 1710 Webster St., Birmingham, Mich. (Junior, 1948).
Leeson, R. E., Dist. Forester, Mich. Dept. of Cons., Baldwin, Mich. (Junior, 1945).
MacDonald, E. D., Forester, Wis. Cons. Dept., Hayward, Wis. (Junior, 1948).
Preston, S. B., Asso. Prof. Wood Tech., Univ. of Mich., Ann Arbor, Mich. (Junior, 1948).
Stubo, O. P., Dist. Ranger, U.S.F.S., Bergland, Mich. (Junior, 1947).
Totton, E. F., Forestry Asst., Consumers Power Co., Lake City, Mich. (Junior, 1948).

Foreign

Member Grade

Phelps, W. R., Research Forester, U. S. Rubber Co., Sumatra, Indonesia; N. C. State, B.S.F., 1950, (Junior, 1950).

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Forestry News

Forest Insect and Disease Research Reviewed at Western Conferences

Specialists in forest entomology and forest pathology from western United States, Canada, and Alaska met in Berkeley, California, December 2-4, 1954, to review progress in their battle against insects and diseases that attack forest trees.

Seventy men were present for meetings of two groups: 45 at the Sixth Annual Western Forest Insect Work Conference, and 25 at the Second Annual Western Forest Disease Work Conference. This was the first time the conferences were held in California and the first time that joint sessions were held.

The Insect Conference devoted most of its attention to a review of current developments in forest insect research, particularly studies of host resistance, progress in biological control through use of insect diseases, and problems in rearing insects for experimental purposes. Also considered was the current status of major insect pests in western North America, as determined by recent surveys.

The program of the Disease Conference included a review of new studies at western research centers, disease research methods, and methods in forest disease surveys. A start was made on standardizing cull studies to produce comparable results, and a plan was adopted to coordinate mistletoe control tests and summarize results to date.

Dr. Vidar Nordin, of the Calgary Forest Biology Laboratory, was elected chairman of the Western Forest Disease Work Conference for the next year. Robert L. Furniss, of the Pacific Northwest Forest and Range Experiment Station, Portland, Ore., was re-elected chairman of the Western Forest Insect Work Conference. The next meeting of these two work conferences will be held in Spokane, Wash., the week after Thanksgiving, 1955.

Appropriate news items about American foresters and happenings in American forestry and related fields are welcomed by the JOURNAL. Contributors should bear in mind the time element of appearance in a monthly publication.—*Editor.*

Bernard Frank and Anthony Netboy Honored

Bernard Frank and Anthony Netboy have received citations from the American Association for Conservation Information "for outstanding services to conservation" through their authorship of the book *Water, Land and People*, published by Alfred Knopf, New York.

State Foresters Flory, Mixon Head Fire Compacts

Charles Flory, state forester of South Carolina, has been elected chairman of the Southeastern Interstate Forest Fire Protection Compact. The states involved in this compact are Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.

James Mixon, state forester of Louisiana, was elected chairman of the South Central Interstate Forest Fire Protection Compact, including the states of Oklahoma, Texas, Arkansas, Louisiana, and Mississippi.

Both compacts were approved by the 83rd Congress in 1954.

National Watershed Congress Held

Some 300 persons attended the National Watershed Congress in Washington, D. C., on December 6 and 7. Those in attendance represented national conservation agencies and small watershed organizations. The purpose of the congress was to discuss problems of watershed protection and development with principal emphasis on the Small Watersheds Act, or Public Law 566, which authorizes the Secretary of Agriculture to cooperate with states and local governments and agencies in watershed management and flood control. A point of chief concern involved means of bringing about better coordination of various federal programs and policies that deal with watersheds and with flood control. Another was the development of machinery for putting national, state, and local forces into vigorous joint action at the local level.

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Western Forestry and Conservation Annual Conference Held

The 45th annual conference of the Western Forestry and Conservation Association was held in San Francisco December 8-10. Five hundred professional foresters and industry leaders from the western U. S. and Canada were in attendence.

The conference was welcomed by California's Governor Goodwin J. Knight. Keynote speaker was Interior Secretary Douglas McKay, who lauded the cooperative efforts between private and governmental agencies which have produced great gains in western conservation and forest management practices, and who stressed the Administration's interest in western water resources development.

Stuart Moir, forest counsel for the Association, spoke on "Western Forestry in 1954."

Conference sessions included many well known speakers and dealt with the following major subjects: "Water and Forests in Regional and National Economy, Integrating Natural Resources Use, Forest Fire Prevention," and "The Business of Forestry." Some 25 resolutions pertaining to timber management, fire and pest prevention, and urging access roads into federal timber areas were adopted during closing sessions. Professor Emanuel Fritz, consulting forester for the California Redwood Association, headed the resolutions committee.

George L. Drake and Clyde S. Martin, industrial forestry leaders, and both past-presidents of the Society of American Foresters, received engraved plaques for their part in "many notable developments in western timber management." The award is made annually by the Association for outstanding contribution to forestry and conservation progress.

Idaho Grange Receives Award for Tree Farm Program

The Kamiah Grange of Kamiah, Idaho, was named one of the top 11 local Grange organizations in America in community service because of its tree farm program. The award ($500) was made to the grange for instigating a program which netted 40 new tree farmers in the Clearwater Valley region of Idaho. Over 4,000 local granges entered the 1954 community service contest, which was jointly sponsored by the National Grange and the Sears-Roebuck Foundation.

Allied

Midwestern Shade Tree Conference

The 10th annual meeting of the Midwestern Chapter of the National Shade Tree Conference will be held February 23-24-25, 1955, in the Chase Hotel, St. Louis, Missouri. The purpose of the organization is to encourage the planting of more trees and ornamental shrubs, to raise the standards of tree care practices by dissemination of knowledge gained through laboratory research and field work and to promote more friendly cooperation among those engaged in arboriculture. Membership is composed of commercial arborists, city foresters, park personnel, nurserymen, educators, research scientists, and others interested in the propagation and care of trees and shrubs.

The convention is open to all who wish to attend. Registration of delegates will start at 8:30 A. M., Wednesday, February 23, and the first paper on the program will be presented at 11:00 A. M. An attendance of approximately 300 members and guests is expected.

The program is primarily directed to discussion of problems of concern to those who perform tree work in the Midwest, but included also are topics of interest to arborists from all sections of the country.

Education

Fourth Annual L.S.U. Forestry Symposium Announced

The fourth annual forestry symposium, sponsored by the School of Forestry at Louisiana State University, will be held on the University campus April 7 and 8, 1955, at Baton Rouge.

The annual event, which has drawn increasingly wide attendance from all over the South, was established in 1952 to provide an occasion where a forestry topic of restricted content but wide general interest could be discussed. Following the same pattern, the 1955

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symposium will center around the theme "Modern Forest Fire Management in the South."

The meeting, for which Prof. A. B. Crow has been named program chairman, will feature prominent speakers on selected topics in the fields of forest fire control and fire use. Time will also be provided for open discussion. Accommodations for visitors will again be available in Pleasant Hall on the main university campus.

Cooperative Graduate Summer Sessions in Statistics

The University of Florida, North Carolina State College, Virginia Polytechnic Institute and the Southern Regional Education Board are jointly sponsoring a series of cooperative summer sessions in statistics.

The first of these sessions was held during the summer of 1954 at Virginia Polytechnic Institute with 89 students from 26 states, the District of Columbia, and 7 foreign countries.

The second session will be held at the University of Florida from June 20 to July 29, 1955. A session is scheduled to be held at North Carolina State College in 1956, and another at Virginia Polytechnic Institute in 1957.

The summer sessions are designed to carry out a recommendation of the Southern Regional Education Board's Advisory Commission on Statistics, on which the three institutions initiating the program are represented. The sessions will be of particular interest to (1) research and professional workers who want intensive instruction in basic statistical concepts and who wish to learn modern statistical methodology; (2) teachers of elementary statistical courses who want some formal training in modern statistics; (3) prospective candidates for graduate degrees in statistics; (4) graduate students in other fields who desire supporting work in statistics; and (5) professional statisticians who wish to keep informed of advanced specialized theory and methods.

Each of the summer sessions will last six weeks and each course will carry approximately three semester hours of graduate credit. The program may be entered at any session, and consecutive courses will follow in successive summers. The summer work in statistics may be applied as residence credit at any one of the cooperating institutions, as well as certain other institutions, in partial fulfillment of the requirements for a master's degree. The catalog requirements for the degree must be met at the degree-granting institutions. Each doctoral candidate should consult with the institution from which he desires to obtain the degree regarding the applicability of the summer courses in statistics.

The faculty for the 1955 session at the University of Florida will include: Professor R. L. Anderson, North Carolina State College; Professor D. B. Duncan, University of Florida; Professor Boyd Harshbarger, Virginia Polytechnic Institute; Professor Carl E. Marshall, Oklahoma A. and M. College; Professor Herbert A. Meyer, University of Florida; Professor George E. Nicholson, Jr., University of North Carolina; Professor Phillip J. Rulon, Harvard University; Professor Walter L. Smith, University of North Carolina; and Professor Dudley E. South, University of Florida.

Courses to be offered this summer are: Statistical Methods I, Statistical Methods II (Design of Experiments), Statistical Theory I, Statistical Theory II (Inference and Least Squares), Advanced Analysis I, Theory of Sampling, Theory of Statistical Inference, Mathematics for Statistics, Statistical Research in Education and Psychology and Seminar on Recent Advances in Statistics.

The total tuition fee will be $35 for the six-weeks term. The holder of a doctorate degree, upon acceptance, may register without the payment of any tuition fee. Living and other expenses at the University are reasonable. The University is located at Gainesville.

Inquiries should be addressed to: Professor Herbert A. Meyer, Statistical Laboratory, University of Florida, Gainesville, Fla.

Ford Model Lumbering Property Given to Michigan Tech

The Ford Motor Company Fund, has announced the gift of the lumber community of Alberta, its well equipped sawmill, and over 1,700 acres of adjacent timberlands, to the Michigan College of Mining and Technology.

Accepting the gift on behalf of Michigan Tech, Grover C. Dillman, president of the college, said the Alberta properties would be used to expand Michigan Tech's forestry department facilities and its program of forest products research.

The community of Alberta is situated ten miles south of L'Anse in Michigan's Upper Peninsula, and 40 miles from Michigan Tech's main campus at Houghton. The village contains a dozen modern houses, two school buildings, a complete "model" sawmill capable of cutting 15,000 feet of timber daily, and a 22-acre artificial lake. The gift includes some 5.3 million feet of standing timber.

Alberta was developed by the late Henry Ford as a model lumbering settlement. Completed in 1936, the town eventually reached a population of 65, of whom 25 were employed at the mill. The Alberta sawmill and others at L'Anse, Kingsford, Pequaming, Big Bay, and Munising once supplied Ford with lumber for station wagon bodies,

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automotive parts, and defense production. The last of the Ford lumbering operations in the Michigan Upper Peninsula ceased in June of 1954.

The Ford Motor Company Fund, which gave the property to Michigan Tech, is a non-profit corporation organized for educational, scientific, and charitable purposes. Supported principally by contributions from Ford Motor Company, it is not related to the Ford Foundation.

Yale Expands Graduate Program

In announcing 1955-1956 fellowships, scholarships, and assistantships, the School of Forestry of Yale University calls attention to two new developments in their graduate program. Their regular instruction in the field of Industrial Forestry is being augmented by specialized instruction under the direction of Prof. E. T. F. Wohlenberg. Beginning with the next school year, the Forest Biology program will include new course offerings in Forest Genetics, Tree Physiology, and other aspects of Forest Tree Improvement, as well as expansion of present instruction in forest soils, meterology, and entomology.

About 20 fellowships and scholarships will be awarded for 1955-1956. Recipients will pay tuition and other charges, but no teaching assistance or service is required. The following grants are available: William Henry Sage, Charles Boughton Wood, and Charles W. Goodyear Fellowships and Scholarships—fellowships of $600 to $1,200 each, and scholarships covering the cost of tuition. John A. Hartford Fellowships in Forest Biology—up to $3,000 available for Ph.D. candidates for studies in biological foundations of forestry. Charles S. Chapman Memorial Fellowships in Industrial Forestry (Weyerhaeuser Timber Foundation)—$850 to $1,650. Union Bag and Paper Company Fellowship—$2,000 for legal residents of Texas, Arkansas, Kentucky, and Virginia southward, with recipient expected to devote part of his study program to independent research. Crown Zellerbach Foundation Fellowship—$1,200 available to graduates of institutions in Oregon and Washington. A number of assistantships are available in both research and instruction, requiring half-time or other work for the school. Further information and application forms may be obtained from: Registrar, Yale School of Forestry, 205 Prospect St., New Haven 11, Conn. Applications should be filed by February 15.

A. D. Moore Appointed Forest Entomologist for University of California

The University of California has appointed Arthur D. Moore, formerly with the California Forest and Range Experiment Station on the Berkeley campus of the University, as its first forest entomologist.

Moore's duties will consist largely of studying the forest insect situation in northern California, according to the Department of Entomology and Parasitology. Lumbermen have been urging greater emphasis on such studies because of the increased relative importance of forest insect damage in recent years.

Moore, a graduate of the State University of New York College of Forestry, has specialized in control of bark beetles with insecticides. Bark beetles are the principal enemies of the western yellow pine, important California species.

Moore will have his headquarters on the Berkeley campus, with the title of assistant specialist in the Agricultural Experiment Station.

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W. C. Finley Joins Battelle Institute

W. C. Finley has joined the staff of Battelle Institute, Columbus, Ohio, where he will spearhead a program to expand research facilities for the forest-products and wood-using industries. He will provide liaison between the research center and the wood industries and will interpret the research needs of these industries, Dr. Clyde Williams, president and director of Battelle, said in announcing Finley's appointment.

Prior to joining Battelle, Finley was active in several trade associations, including the American Walnut Manufacturers Association, the National Cedar Chest Association, the Veneer Association, and the Aromatic Red Cedar Association. While industry forester for the American Walnut Manufacturers Association, Finley was an industry consultant to the Indiana Hardwood Lumbermen's Association, Illinois Protective Union, Ohio Timber Industry Association, Illinois Sawmill Operators' Association, Illinois Tech-

W. C. FINLEY

nical Forestry Association, the Forest Conservation Committee of National Lumber Manufacturers Association, and the Illinois, Michigan, Missouri Forest Research Centers, operated by the U. S. Forest Service.

Earlier in his career, Finley was engaged in forest management work while employed by the University of Michigan, Central States Forest Experiment Station, and Ohio Division of Forestry. A native of Columbus, Ohio, Finley attended The Ohio State University and was graduated from the University of Michigan with a B. S. degree in forestry. In addition to his trade association affiliations, he is a member of the Forest Product Research Society and the Society of American Foresters.

L. C. Lewis Directs A.F.P.I. Raleigh Office

A graduate forester and former newspaperman, L. C. Lewis of Berryville, Va., has been named district manager of American Forest Products Industries at Raleigh, N. C. The appointment was announced by C. A. Gillett of Washington, D. C., managing director of the organization.

Lewis will direct A.F.P.I. activities in North Carolina, South Carolina, and Virginia. He succeeds Clarence Streetman who resigned to become manager of the Tifton, Ga., Chamber of Commerce.

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Upon inquiring, Mr. Grinols discovered that he could treat railroad ties with the Osmose Treatment for a fraction of the cost of any other method and that it wasn't necessary to invest in a complicated plant to do so. Any species of green or water-soaked wood can be used and treating solution can be applied by spray or dip method. The Grinols Company immediately set up a modest treating tank at their Bemidji sawmill and found many ready customers. Last year when they started getting orders for thousands of ties at a crack they had to install the system shown above. Since then, they have tapped the huge farm market and are now producing treated Tamarack fence posts which are sold through their exclusive sales agents in Minneapolis.

If you own a sawmill and would like full details on how you can cash in on the ever-expanding market for treated railroad ties, mine timbers, fence posts and lumber without making a big investment, write to Joseph M. Bray, Vice-President, Osmose Wood Preserving Co., 980 Ellicott Street, Buffalo, N. Y.

(Advertisement)

GEORGIA STUDENT receives Homelite scholarship. Gerry Allen, (*L*) East Point, Ga. a junior forestry major at the University of Georgia, has been awarded a $500 scholarship by the Homelite Corporation of Port Chester, New York. The scholarship was awarded on the basis of Allen's scholarship, outstanding ability, and interest in the School of Forestry. Norman Supove (*3rd from L*) of Jacksonville, Fla., representing Homelite Corporation, presented the check to Allen. Present also were University President O. C. Aderhold (*2nd from L*) and forestry Dean D. J. Weddell (*R*). Similar scholarships will be awarded annually by the firm in behalf of its dealers in the Southeast.

O. T. Swan, Lumber Association Manager Retires, Successor is Allan S. Haukom

O. T. Swan, secretary-manager of the Northern Hemlock and Hardwood Manufacturers Association during the past 40 years with headquarters in Oshkosh, Wis. retired January 1, 1955. He was succeeded by Allan S. Haukom, assistant secretary-manager and association forester.

The trade association is made up of 90 lumber manufacturers, veneer and plywood firms, timberland owners, and hardwood flooring manufacturers in Michigan, Wisconsin, Minnesota, and Illinois.

Mr. Swan joined the Association in 1915 as manager. He is a graduate forester and had been with the U. S. Forest Service in Washington, D. C. before going to Wisconsin. He has been active in numerous capacities in lumber industry affairs and in 1947 and 1948 served as a member of the Natural Resources Committee of the U. S. Chamber of Commerce and on subcommittees dealing with reforesta-

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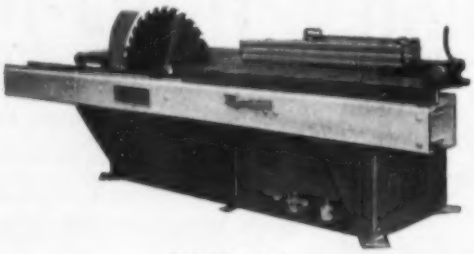

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FOREST SCIENCE is being published with the cooperation of the Society of American Foresters and forest research and educational organizations generally. Its editorial board is composed of Henry Clepper, executive secretary of the Society of American Foresters; V. L. Harper, assistant chief (forest research), Forest Service, U.S. Department of Agriculture; and Stephen H. Spurr, professor of silviculture, University of Michigan, *Chairman*. It is designed to bring together in a single journal of international circulation papers of interest to research workers, teachers, and administrators and will supplement, rather than compete with, the *Journal of Forestry*.

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tion and conservation matters. He has been leader in the development of progressive forestry programs throughout the Lake States.

Allan S. Haukom, who succeeds to the management of the Association, has been assistant secretary-manager and forester since July 1st. He is a 1939 forestry graduate of Iowa State College and was with the state Conservation Commission in Madison, Wis. for 12 years. From 1951 until July of 1954 he was secretary of the Wisconsin Forestry Advisory Committee to the Wisconsin State Conservation Commission.

Government

South Carolina County Boards Assist State Commission

County Forestry Boards from 45 counties in South Carolina attended a series of seven meetings held in each part of the state in December for the purpose of assisting the South Carolina State Commission of Forestry in planning the forest conservation program for 1955.

Legislative leaders from each county delegation to the General Assembly were invited to attend by the chairman of each County Forestry Board in order that they might assist in developing an improved forest conservation program.

State Forester C. H. Flory presided at the meetings.

Oregon Loggers Required to Notify Adjacent Land Owners

Applicants for permits to harvest timber for commercial purposes within the state of Oregon will, after January 1, 1955, be required to notify adjacent timberland owners of their intention, in accordance with action taken by the State Board of Forestry.

The object of the requirement, as brought out by board discussion, is to acquaint adjacent timberland owners of the proposed logging activities in order that steps may be taken to establish accurate cutting lines and also to inform them of the creation of a potential fire hazard.

State Forester George Spaur stated that the board order would affect approximately 10,000 loggers who would seek permits during 1955. He added that the department will simplify the procedure as much as possible. All district headquarters have been instructed to assist the logger and make land records available to applicants. Blank certification forms to be filled out indicating that the board requirements have been fulfilled will be provided.

Forest Research Committee Informed of Expanded Work

Members of the Forest Research Advisory Committee have been informed that provision of additional funds has enabled the Department of Agriculture to implement four of the committee's 1953 recommendations. The committee met in 1954 at Madison, Wis., in November. Established under authority of the Research and Marketing Act of 1946, it meets annually.

Committee recommendations being implemented include fire prevention (speeding up work on logging slash, greater participation in cooperative studies of lightning storms and strengthening research on fire danger ratings), bark beetle studies (expand and broaden research), improvement of forest insect survey methods (work on both aerial and ground survey methods for detecting insect outbreaks will be intensified), and tree improvement (research to develop better trees through seed sources studies, seed selection, propagation and breeding will be expanded).

The committee made a number of additional specific recommendations for new and expanded work in forest research. Among them were:

(1) More investigations to improve forest regeneration methods; (2) expand research to determine basic management requirements needed to rehabilitate and maintain at full productive capacity the forested and asso-

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ciated rangelands of western mountainous areas; (3) develop better ways of forecasting the danger and preventing the occurrence of forest fires; (4) provide for speeding up the Forest Survey to maintain a resurvey schedule varying from 8 to 15 years in different regions; (5) initiate work in forest recreation; and (6) intensify work on the utilization of wood harvesting and processing residues, and develop effective and profitable uses for additional species and lower quality logs.

The committee also recommended an increase in marketing research funds to develop practical knowledge for growers, particularly those with smaller holdings, to market their timber efficiently and profitably.

John A. Mitchell Retires After 45 Years in the Forest Service

Mr. John A. Mitchell, who has been an employee of the U. S. Forest Service in fire research work for over 45 years, 31 of which were spent at the Lake States Forest Experiment Station, retired December 31, M. B. Dickerman, director of the Station has announced.

Mr. Mitchell began his career in 1909 as a forestry field assistant on the Tahoe National Forest in California. At that time, Theodore Roosevelt had just completed his second term as President of the United States, and Gifford Pinchot, was Chief Forester.

When Mr. Mitchell joined the staff of the Lake States Forest Experiment Station at its beginning in 1923, he was already well known in the field of forest fire research. Mr. Mitchell has played an important role in the development of the highly effective system of forest fire detection and control that now exists in the Lake States. He is also well known both as a factual writer of forest fire history and as an analyst of the great changes in our forests resulting from fires.

On December 14 the staff of the Lake States Station expressed their appreciation of Mr. Mitchell's years of loyal service at a dinner given in his honor. An album of letters from present and former colleagues and of pictures illustrating his work was presented to him by his co-workers.

Georgia Forest Survey Completed

Georgia has 13 percent less saw timber now than it had 18 years ago, according to the Forest Service, U. S. Department of Agriculture. This finding is based on a resurvey of Georgia's forest resources in 1953, first intensive examination of the state's forests since the initial survey in 1936.

In spite of the drop in saw timber, the total volume of timber in Georgia has not changed much during the period. The big change is a shift in volume from large timber to small. For instance, pine saw timber dropped 15 percent but pole timber increased almost enough to offset this loss. The combined volume of both large and small pine timber is only 2 percent less than in 1936. Hardwoods and other species show the same trend.

A drop in saw timber volume is not surprising in view of the sharp rise in demand for lumber and pulpwood in Georgia. During the period since the last survey, annual production of lumber was more than doubled. Pulpwood production jumped from two hundred thousand cords in 1937 to 2.5 million cords in 1952. Georgia now produces more pulpwood and softwood lumber than any other state in the South.

Only the tremendous upsurge in the number of young trees, including pine, prevented more serious losses in timber volume. The number of pine trees increased 41 percent, enough to fully stock a million and a half acres. Hardwoods increased even more.

A large part of this improvement in pine stocking resulted from the seeding in of pine on abandoned farmland. Since the first survey, enough abandoned farmland reverted to forest, in excess of land clearing, to add more than 2.5 million acres to the forest area. Also, improved fire protection contributed to better stocking. In 1936 an estimated 5.4 million acres burned over in Georgia; by 1952 the burned-over area had been reduced to about 600,000 acres. The planting of pine on more than 300,000 acres has also helped improve stocking.

Other important trends were revealed by the new forest survey. Enough pine type was converted to hardwood through cutting to reduce the pine area by 800,000 acres between surveys. Also, the growing space occupied by cull trees is increasing at a rapid rate and in the period between surveys, the volume in cull trees, principally hardwoods, more than doubled.

In spite of the large increase in number of trees since the first survey, a fourth of the forest area is still less than 40 percent stocked. Three-fourths of this area is expected to restock naturally, but 1.4 million acres require planting to bring the land back in forest production.

Information on the forest resources of Georgia has been published in separate releases covering Southeast, Southwest, Central, and North Central and North Georgia. Statewide statistical data are now available in the new Forest Survey Release No. 44, "Forest Statistics for Georgia, 1951-53" from the Southeastern Forest Experiment Station, Asheville, North Carolina. An analysis of Georgia's forest resources and industries supplementing these statistical data is now under way.

J. C. Evenden Retires; Succeeded by D. E. Parker

After 40 years of service, James C. Evenden, chief of the Division of Forest Insect Research, Intermountain Forest and Range Experiment Station, retired December 31, according to an announcement by Director Reed W. Bailey.

As leader of the Forest Insects Laboratory at Coeur d'Alene, Idaho, Evenden has gained nation-wide recognition in his field. He is a Fellow in the Society of American Foresters and a former Member of the Council. He

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played a major part in the first large-scale spraying operation of western forests by airplane. This spray job, which covered more than 400,000 acres in northern Idaho in 1947, was successful in saving valuable stands from the Douglas-fir Tussock moth. His career in developing forest insect control programs in the Rocky Mountains was culminated with his recent responsibility as technical advisor to the large spruce logging operations in Montana and Idaho. This project has been for the purpose of combating a severe infestation of spruce bark beetles.

Mr. Evenden was employed by the Bureau of Entomology of the Department of Agriculture from 1914 to 1953, except for a period of military service during World War I. During those years he directed insect research and survey work in the Northern Rocky Mountain region. In 1953 when the forestry activities of the Bureau of Entomology and Plant Quarantine were taken over by the Forest Service, he became division chief in charge of all forest insect research and survey work at the Intermountain Station.

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Mr. Evenden received his B. S. degree in forestry from the Oregon Agricultural College in 1914.

In paying tribute to Evenden's long period of service, Director Bailey said, "He has contributed greatly not only to research findings on forest insects but has been instrumental in saving much valuable timber with his technical guidance or control programs. Jim Evenden has had extraordinary success in working with federal, state, and private owners of forest lands in the fight against one of the forests' greatest enemies insect killers, and in doing so has demonstrated the value and necessity of cooperation."

D. E. Parker, assistant chief of the Division of Forest Insect Research, Forest Service, Washington, D. C. will succeed Evenden. Parker has been engaged in entomological research for the Department of Agriculture since 1925 and has served as assistant chief of the Division of Forest Insects in Washington since 1947.

North Central Region Forest Supervisor Transfers Announced

Three shifts in national forest supervisors, involving two national forests in the North Central Region of the Forest Service, have been announced by Regional Forester H. Dean Cochran, Milwaukee, Wis.

Paul S. Newcomb, Cadillac, Mich., supervisor of the Lower Michigan National Forest since 1945, has transferred to supervisorship of the Green Mountain National Forest, with headquarters at Rutland, Vt.

Louis A. Pommerening, of Park Falls, Wis., who has been supervisor of Chequamegon National Forest since 1944, succeeds Newcomb on the Lower Michigan.

William R. Paddock of Cleveland, Tenn., who has been supervisor of the Cherokee National Forest since 1946, has taken over supervisorship of the Chequamegon.

Products

New Type Saw Blade

As a result of tests made by timber cutters in the pulpwood forests of Canada and Sweden, Sandvik Saw & Tool, division of Sandvik Steel, has developed a new type bow saw blade known as Super Sandvik No. 21. The company reports that it is made of highly tempered Swedish charcoal steel and that the new blade combines five radical improvements (1) the teeth are filed and precision set at the factory, then each tooth point is induction hardened, (2) the super-hardness of the teeth eliminates the necessity of filing, thus adopting the throwaway razor blade type principle, (3) a new scientific tooth arrangement of only two cutting teeth ahead of each raker tooth removes sawdust faster, prevents clogging, and makes cutting easier, (4) blades are only ¾" wide and will not bind, thus reducing friction, and (5) each blade is individually packed in a moisture-proof wrapper, assuring the user of a factory fresh blade at all times. Literature available from Sandvik Saw and Tool, 47 Warren St., New York, N. Y.

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